

Six unusual *Cladotanytarsus* Kieffer: towards a systematics of the genus and resurrection of *Lenziella* Kieffer (Diptera: Chironomidae: Tanytarsini)

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Abstract

Following the inclusion of *Lenziella* Kieffer, 1922 into *Cladotanytarsus* Kieffer, 1921, the genus consists of two subgenera: *Cladotanytarsus* s. str. (type species: *C. pallidus* Kieffer, 1922) and *Lenziella* Kieffer, 1922 (type species: *L. bicornuta* Kieffer, 1922). Six species of the subgenus *Lenziella* known from the Holarctic region are diagnosed and reviewed. Lectotype of *Cladotanytarsus wexionensis* Brundin, 1947 is designated, and the name is treated as a **synonym** of *Cladotanytarsus* (*L.*) *bicornutus* Kieffer, 1922 in a **new combination**. *Cladotanytarsus* (*L.*) *amandus* Hirvenoja, 1962 (male) and *C.* (*L.*) *crusculus* (Sæther, 1971) (male, female, pupa) are redescribed. *Cladotanytarsus* (*L.*) *latissimus* **sp. nov.** (male, female, pupa), *C.* (*L.*) *piniger* **sp. nov.** (male), and *C.* (*L.*) *subletteorum* **sp. nov.** (male, female, pupa) are described. Keys to adults and pupae of *Lenziella* as well as data on biology of the species are presented.

Key words: Diptera, Chironomidae, *Cladotanytarsus*, *Lenziella*, taxonomy, new species, synonymy, keys, biology

Introduction

Kieffer (1922a) introduced the name *Lenziella* for a single species, *L. bicornuta*. Later on, Sæther (1971) described another unusual species, *L. cruscula*, and suggested the subgeneric position for *Lenziella* in *Cladotanytarsus* Kieffer, 1921, the concept supported primarily by Sublette and Sublette in their technical report (1979). *Lenziella* and *Cladotanytarsus* were also treated as synonyms (e.g. Cranston 1989, Oliver *et al.* 1990). Unfortunately, the location of the type material for *L. bicornuta* is unknown (probably lost during a fire in Budapest), thus the name, with a cursory description of the relevant taxa, had to be regarded as doubtful (Ashe & Cranston 1990). Consequently, *Cladotanytarsus* and *Lenziella* could not be synonymised formally, and a systematic status of *Lenziella* had to remain open until the time when the type species would be precisely defined.

This interesting question, of which species has actually been used by Kieffer for his designation of the type for *Lenziella*, was raised again some years ago (Spies, pers. comm.). A subsequent examination of a rich material and re-examination of Professor Brundin's collection revealed *Cladotanytarsus wexionensis* to fit Kieffer's description well, thus the name is here proposed as a synonym of *Lenziella bicornuta* [for details see remarks for *Cladotanytarsus* (*L.*) *bicornutus*]. In Professor Sublette's collection of *Cladotanytarsus*, I found three other species similar to *L. bicornuta* and *L. cruscula*, and labelled as '*Cladotanytarsus* (*Lenziella*)'. Further records showed *Cladotanytarsus amandus* Hirvenoja, 1962 to be also a member of the same peculiar group of species, and confirmed the concept of *Lenziella*, herein presented as a subgenus of *Cladotanytarsus*.

Materials and methods

The materials were collected with a sweep net, Malaise, tent, UV, emergence and funnel traps, and with Surber samplers. The specimens were slide-mounted in Canada balsam or in Hoyer's mixture. The illustrations, descriptions (except for body colouration taken from fresh specimens preserved in alcohol and/or not cleared), and measurements were taken from slide-mounted individuals. The wing was measured from the arculus to the tip. Lengths of leg segments were rounded off to the nearest 5 µm, and antennal and leg ratios (AR, LR) were calculated to 0.01. The dimensions are given as ranges, followed by the mean (in parentheses) when three or more specimens were measured. The head structures, wing and legs were not measured in pharate specimens. The morphological terminology and abbreviations follow Sæther (1980) and Langton (1991). The illustrations were prepared using the technique described by Gilka (2008). The type specimens of new species and the individuals *Cladotanytarsus* (*L.*) *crusculus* examined for this study have been deposited at the Department of Entomology, University of Minnesota, St. Paul, USA. The type series of *Cladotanytarsus wexionensis* and other specimens collected by Professor L. Brundin are housed in the Swedish Museum of Natural History, Stockholm, Sweden. Other specimens examined are available on request from the Department of Invertebrate Zoology, University of Gdańsk, Poland.

Systematics

To accentuate the separate systematic position of the subgenus *Lenziella*, the diagnosis includes characters displayed by adult males and females as well as those of the pupae. The diagnosis of *Lenziella* larvae is identical with that concerning the description of the only larva known from the subgenus, that of *Cladotanytarsus* (*Lenziella*) *crusculus* (Sæther 1971). The diagnosis of the subgenus *Lenziella* was compared with the emended generic diagnosis of adult males (Cranston *et al.* 1989, Jacobsen & Bilyj 2007), with the diagnosis and descriptions of females (Sæther 1977, Bilyj & Davies 1989, Ekrem 1999) as well as with characters supplementing the recently emended diagnoses of the pupae of the genus *Cladotanytarsus* (Pinder & Reiss 1986, Bilyj & Davies 1989, Langton 1991, Langton & Visser 2003, Jacobsen & Bilyj 2007). The published diagnosis of the inadequately known larvae of *Cladotanytarsus* (Pinder & Reiss 1983) required complementing, and thus further studies.

Genus: *Cladotanytarsus* Kieffer, 1921

Cladotanytarsus Kieffer, 1921: 277.

Type species: *Cladotanytarsus pallidus* Kieffer, 1922b: 100 (subsequent monotypy).

Diagnosis

Male. Small to moderate in size, wing length 0.95–2.5 mm. Antenna usually composed of 13 well separated flagellomeres or only 10–11 distinct flagellomeres present; plume well developed, reduced or vestigial. Frontal tubercles large to minute, rarely absent. Palp 5-segmented, of usual shape, with palpomeres 3–5 elongated or palpomeres 3–5 shortened and palp reduced. Wing membrane only distally covered with macrotrichia or completely bare. Combs of middle and hind tibiae separated or absent; usually each comb (if present) bearing single spur and/or combs/spurs vestigial or absent. Gonostylus usually shorter than gonocoxite; exceptionally gonostylus longer than gonocoxite (*C. teres* Hirvenoja, *C. matthei* Gilka). Anal point subtriangular, lanceolate or club-shaped, exceptionally broadly trapezoidal (*C. latissimus* sp. nov.), usually with crests and spinulae; rarely crests and spinulae absent and/or anal tergite strongly elongated (*C. bilinearis* Glover, *C. cyrylae* Gilka, *C. ecristatus* Reiss, *C. sagittifer* Gilka). Four pairs of hypopygial volsellae. Digitus usually long, extending far beyond superior volsella, with finger-like tip; exceptionally digitus short, reaching apex of superior volsella (*C. teres*, *C. latissimus*); inner setae (usually 3, rarely more) placed on small protuberance or on prominent lobe at base of superior volsella; median volsella composed of stout stem bearing furcate lamellae; inferior volsella with dorsomedian protrusion and/or globular swelling ventrally. **Female.** Antennal flagellum composed of 4 flagellomeres, with distal flagellomere slightly longer than proximal one or proximal flagellomere divided and flagellum 5-segmented. Palp, wing and legs as in male, with usual sexual differences. Sternite VIII occasionally with few dispersed setae placed under vaginal floor or SVIII with several setae placed in longitudinal rows under vaginal floor close to median margins or directly on vaginal margin. Labia fine, never protruding beyond posterior margin of SVIII and often drawn out into finger-like lobes or labia extensive and protruding beyond posterior margin of SVIII. Spermathecal ducts almost straight or strongly curved. **Pupa.** Frontal apotome with small cephalic tubercles and/or with fine sculpture or smooth, or cephalic tubercles large and frontal apotome with extensive fields of strongly granulose sculpture. Hemispherical tubercle between basal lobe of thoracic horn and precorneal swelling absent or present. **Larva.** See diagnosis by Pinder & Reiss (1983), remarks for *C. (L.) crusculus* and discussion. Nearly 70 species described, distributed worldwide.

Subgenus: *Cladotanytarsus* s. str. Kieffer, 1921

Type species: as for the genus.

Diagnosis

As for the genus, with the exclusion of characters given in diagnosis for the subgenus *Lenziella*. Over 60 species described, distributed worldwide.

Subgenus: *Lenziella* Kieffer, 1922

Type species: *Lenziella bicornuta* Kieffer, 1922a: 361 (original designation by monotypy).

Diagnosis

Male. Antennal flagellum usually abbreviated, composed of 10–13 flagellomeres; plume vestigial to well-developed but showing tendency to reduction (setae short and/or sparse). Palpomeres 3–5 slightly shortened to strongly reduced (Fig. 15). Legs of middle and hind pair slender to stocky, always with tibiae bearing stout apical lobes armed with dense curved setae (Figs 2C, D; 4B–E; 5, 8, 11, 12: B, C). Inferior volsella with distinct globular swelling ventrally (Figs 2H, 4K, 5G, 8G, 11G, 12H). **Female.** Antennal flagellum composed of 4 or 5 flagellomeres, proximal flagellomere showing tendency to division. Palp, wing and legs as in male. Sternite VIII with several setae placed in longitudinal rows under vaginal floor close to median margins or directly on vaginal margins. Labia extensive, protruding beyond posterior margin of SVIII. Spermathecal ducts strongly curved (Figs 6A, B; 9A–D; 13A, B). **Pupa.** Frontal apotome with large cephalic tubercles and field/s/ of strongly granulose sculpture (Figs 3, 7, 10, 14: A). Hemispherical precorneal tubercle placed between basal lobe of thoracic horn and precorneal swelling (Figs 3, 7: B, C; 10B; 14B, E). **Larva.** As for the only known larva of *C. (L.) cruscus*. Six species known in the Holarctic region.

Review of species

Cladotanytarsus (Lenziella) bicornutus (Kieffer, 1922), **comb. nov.**

(Figures 1–3, 15B)

Lenziella bicornuta Kieffer, 1922a: 361 (adult male, Germany); Sæther 1971: 1817, 1820, 1824, 1826 (*Lenziella cornuta* Kieff., incorrect spelling); Ashe & Cranston 1990: 321 (as *nomen dubium* in *Cladotanytarsus*).

Cladotanytarsus wexionensis Brundin, 1947: 81 (adult male, figs 121, 121a; Sweden); Brundin 1949: 783 (remarks); Thienemann 1951: 642 (adult male, fig. 7, Germany); Shilova 1976: 32 (adult male, figs 17.2, 19, 20; pupa, figs 10.6, 11.5, 12.5, 15.6; Russia); Albu 1980: 280 (adult male, fig. 189; Romania); Gilka 2001: 326 (adult male, figs 10a–i, 11e; Poland); **syn. nov.**

Materials examined

Cladotanytarsus wexionensis. Lectotype. Male. SWEDEN. Växjösjön, 29 July 1945 (A. 11: 4), leg. L. Brundin (Fig. 1). Paralectotypes. 12 males + 3 males without hypopygium + 1 hypopygium, same data as holotype. Other materials examined. FINLAND. Kotka, 5 August 2002, 2 males; Vesijärvi in Lahti, 11 July 2002, 2 males; W. Gilka. POLAND. Choszczno at Lake Klukom, 17 June 2004, 8 males, P. Dominiak. Gdańsk-Osowa, Lake Wysockie, 6 July 1979, 1 male, R. Szadziwski. Las Piwnicki reserve near Toruń, 9 July 1981, 2 males, R. Szadziwski. Niesiołowice at Lake Długie, 13–16 July 1997, 2 males, 11–14 September 1998, 2 males; at Lake Czarne, 22 May 2010, 1 male; W. Gilka. Osiek at Lake Kałebie, 14 May 2005, 1 male, Ł. Mauricz. Silec near Kętrzyn, 2–3 July 1981, 2 males, R. Szadziwski. ROMANIA. Small lake 4 km E of Ciobanu near Hirsova, 19 June 2007, 9 males, P. Dominiak & R. Szadziwski. SWEDEN. Småland, Södra Bergundasjön, Vallen, 29 July 1946, 35 males (A. 84), 21 June 1947, 4 Pex (A. 282), 21 May 1947, 3 males (A. 171), 27 July 1948, 3 Pex, 1 male (A. 364), July 1948, 16 Pex, L. Brundin. Storsjön near Ovansjö, 18 July 2003, 17 males, W. Gilka.



FIGURE 1. Lectotype male of *Cladotanytarsus wexionensis* Brundin, 1947, slide-mounted after the year 2000.

Diagnostic description

The species has been described (as *Cladotanytarsus wexionensis*) several times as adult male, whereas description of the pupa was provided by Shilova (1976). However, the published descriptions are incomplete and do not contain all the diagnostic characters indicative of *Lenziella*.

Male (n = 105, incl. 3 specimens without hypopygium + 1 hypopygium; dimensions in Tables 1 and 8).

Colouration (in alcohol). Variable. Antennal pedicel, tentorium, scutal stripes, distal half of postnotum, and sternum light orange to dark brown or black. Antennal flagellum, scutellum, and legs pale green to olive brown. Head capsule, ground colour of thorax and haltere yellowish to olive green. Abdominal segments yellowish green to olive brown, with posterior margins usually somewhat darker. Wing membrane with pale greenish undertone; C, M and radial veins slightly darker.

Head. Antenna usually composed of 13 flagellomeres or flagellomeres 1–2 and/or 11–13 fused (Fig. 2A). Plume fully developed or slightly reduced or flagellum covered with short and sparse setae (Fig. 2A; see also Thienemann 1951: fig. 7 and Gilka 2001: fig. 10a). Frontal tubercles stout, usually subconical. Palp variable in length; intermediate form as in Fig. 15B.

Wing. Strongly reduced in anal section but relatively broad in median part. At most C, R, R₁ distal half of R₄₊₅, M₁₊₂, M₃₊₄, Cu₁ and proximal half of An bearing sparse macrotrichia, but M₃₊₄, Cu₁ and An usually bare; other veins always bare. Membrane with sparse macrotrichia in apical section of r₄₊₅ and m₁₊₂ or completely bare. Rarely only C and R with macrotrichia and remaining veins and cells bare (n = 2). FCu slightly distal of RM. R₄₊₅ ending distally of M₃₊₄ and proximally of M₁₊₂.

Legs. Slender to slightly shortened, stout. Tibial spur of fore leg usually present, straight or slightly curved (Fig. 2B). Tibial spurs of middle and hind leg usually absent or shortened, double or single; combs usually present but vestigial, variable in size and in number of teeth (Fig. 2C, D; Table 8). Tibial apices of middle and hind leg enlarged, with relatively short and curved setae (mid leg, Fig. 2C) or with tuft of long and finely bent setae (hind leg, Fig. 2D). For lengths of leg segments see Table 1.

TABLE 1. Lengths (µm) of leg segments of male *Cladotanytarsus* (*L.*) *bicornutus* (Kieffer, 1922).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
P ₁	565–720 (635)	375–480 (420)	595–730 (655)	325–405 (360)	270–325 (295)	185–250 (215)	105–135 (120)
P ₂	550–700 (625)	455–575 (520)	175–295 (245)	90–170 (140)	65–130 (105)	50–100 (85)	50–90 (75)
P ₃	615–750 (675)	550–750 (660)	220–420 (345)	115–270 (210)	110–230 (185)	75–145 (120)	70–110 (95)

Hypopygium (Fig. 2E–H). Gonostylus variable in shape, slender or broadened in distal part and widely rounded apically (see also Gilka 2001; fig. 10c, d). Anal tergite with V-type bands. Anal point variable in shape, as shown in Fig. 2F, subtriangular or somewhat lanceolate, usually with narrowed nipple-shaped apex, bearing distinct spinulae and numerous fine tubercles forming an ornament on ventral side; usually entire area surrounding base of anal point covered with microtrichia. Superior volsella rounded at base, slightly narrowed in median part and distinctly swollen apically, bearing dense microtrichia in its proximal one-third. Digitus long, usually strongly curved, with finger-like tip. Long inner setae placed on small protuberance at base of superior volsella (Fig. 2E). Stem of median volsella usually straight or slightly curved and directed laterally, bearing 6–7 long furcate lamellae (Fig. 2G). Inferior volsella reaching over half length of gonostylus, straight and directed posteriorly, slightly swollen in distal half, apically rounded, with slightly protruding dorsomedian ridge and distinct globular swelling ventrally (Fig. 2E, H).

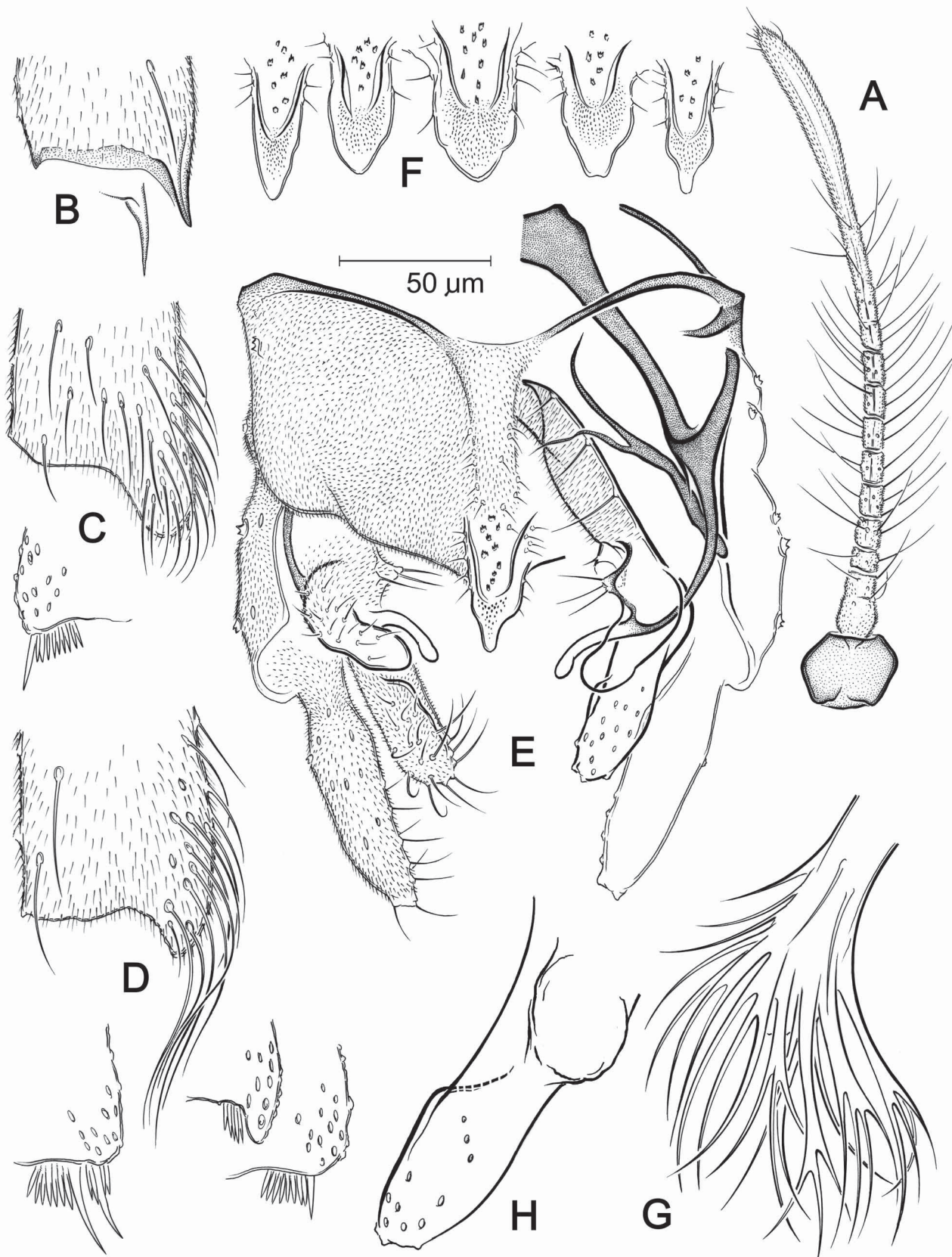


FIGURE 2. *Cladotanytarsus* (*Lenziella*) *bicornutus* (Kieffer, 1922), male. A: antenna with fused flagellomeres and reduced plume; B–D: tibial apices of fore leg (B), middle leg (C) and hind leg (D) (variation); E: hypopygium; F: anal point (variation); G: median volsella (magnified x 2 relative to hypopygium); H: inferior volsella with ventral swelling.

Pupa (exuviae, n = 23).

Length. 3.3–3.6 (3.5) mm.

Colouration (slide-mounted specimens). Pale yellowish.

Cephalothorax. Frontal apotome with large conical cephalic tubercles, 80–100 (87) μ m long, each with seta as long as tubercle; extensive fields of granulose sculpture covering bases of tubercles and apotome laterally (Fig. 3A). Thoracic horn spindle-shaped, slightly curved, large, 290–305 (300) μ m long, with stout cylindrical basal lobe and c. 30–35 chaetae forming lateral fringe and apical tuft; longest chaetae c. 0.3–0.4 as long as horn; precorneal swelling with 3 setae; precorneal tubercle hemispherical, 8–10 μ m high and 12–15 μ m wide, placed between basal lobe and precorneal swelling (Fig. 3B, C). Thorax with narrow median patch of c. 60–80 small spinules becoming minute points posteriorly. Wing sheath with small nose, slightly projecting (5–8 μ m) beyond posterior margin.

Abdomen. TI–VIII with sublateral bands. Tergite patches relatively small for the subgenus, each consisting of short spines becoming spinulate shagreen posterolaterally, with microspinulae/points arranged evenly; TII and TVI patches oval, TIII–V patches elongate, two times as long as wide; TI and TVII without patches (Fig. 3E). TII hook row 200–240 μ m long, c. 0.5–0.6 of TII width, composed of 130–150 densely arranged hooklets (Fig. 3D). Pedes spurii A absent, pedes spurii B vestigial. Posterolateral comb of segment VIII stout, 63–71 (67) μ m wide, with 15–25 lanceolate teeth and 3–10 smaller spines (Fig. 3F). SVIII with small subtriangular shagreen anterolaterally and with single-lobed, c. 30 μ m wide tubercle in posterolateral position. Taeniate L-setae on segments V–VIII arranged as follows: 2 + 1; 2 + 1; 2 + 2 or 2 + 1; 2 + 3 or 5–6 equidistant on each side. Anal lobe with 2 dorsal setae and fringe composed of 40–47 taeniate setae per side (Fig. 3E).

Adult female and larva: unknown.

Remarks

Kieffer's (1922a) description of *Lenziella bicornuta* is based on specimens collected by Thienemann from Holstein (north Germany). Among the few characters originally given for the adult male of *L. bicornuta*, one of the most distinct is the shortened (12-segmented) antenna without plume (op. cit.). Later, Brundin (1947) described *Cladotanytarsus wexionensis* based on males which also show the reduced antennae (examined). Interestingly, Thienemann recorded a species with the abbreviated antennae, too. He described it in detail (Thienemann 1951, fig. 7) and identified it as *C. wexionensis* (Mecklenburg, north Germany). Thus the source material for both Kieffer's *L. bicornuta* and Thienemann's *C. wexionensis* comes from the same geographical area. Moreover, the original description of *L. bicornuta* comprises characters which fit Brundin's (1947) *C. wexionensis* and the present redescription well. The adult male is usually lightly coloured, the tibial apices of middle and hind legs are enlarged, spurs and combs are reduced or replaced with tufts of setae, and wing setation is reduced. All these characters indicate that both names apply to the same peculiar species. In fact, the present redescription includes a few minor differences with respect to Brundin's (1947) dimensions, the latter having been obviously taken from individuals preserved in alcohol and slide-mounted well after (Ferrer, Sublette, pers. comm.) (Fig. 1, Table 8).

A distinct variability in the diagnostic structures of *C. (L.) bicornutus* is observed in the present study both in adult males from different populations and those representing one population/sample. The specimens examined are different in their body size and colouration, number of antennal flagellomeres, and in the plume structure (cf. Shilova 1976). Tibial spurs and combs can be double, single, usually vestigial or altogether absent (Fig. 2B–D). The variability is also demonstrated in the shape of the gonostylus and hypopygial anal point (Fig. 2F; Gilka 2001, fig. 10c, d).

The species can be identified based on the following character combination: tibia of hind leg bearing tuft of long and finely bent setae on apex, but the setae relatively short on middle leg tibia (Fig. 2C, D); superior volsella slightly narrowed in median part and distinctly swollen apically (Fig. 2E); stem of median volsella stout but short, straight or slightly curved and directed laterally (Fig. 2G); straight inferior volsella reaching over half length of gonostylus (Fig. 2E); pupa of *C. (L.) bicornutus* is distinct in having large cephalic tubercles with extensive fields of granulose sculpture at base (Fig. 3A), large spindle-shaped thoracic horns (Fig. 3B), numerous hooklets on tergite II (Fig. 3D), numerous teeth/spines in posterolateral comb of segment VIII (Fig. 3F), and relatively high number of taeniate setae on anal lobe (Fig. 3E).

C. (L.) bicornutus lives preferentially in meso- and eutrophic lakes and small lentic freshwater bodies. The species can also dwell in oligohaline marine habitats.

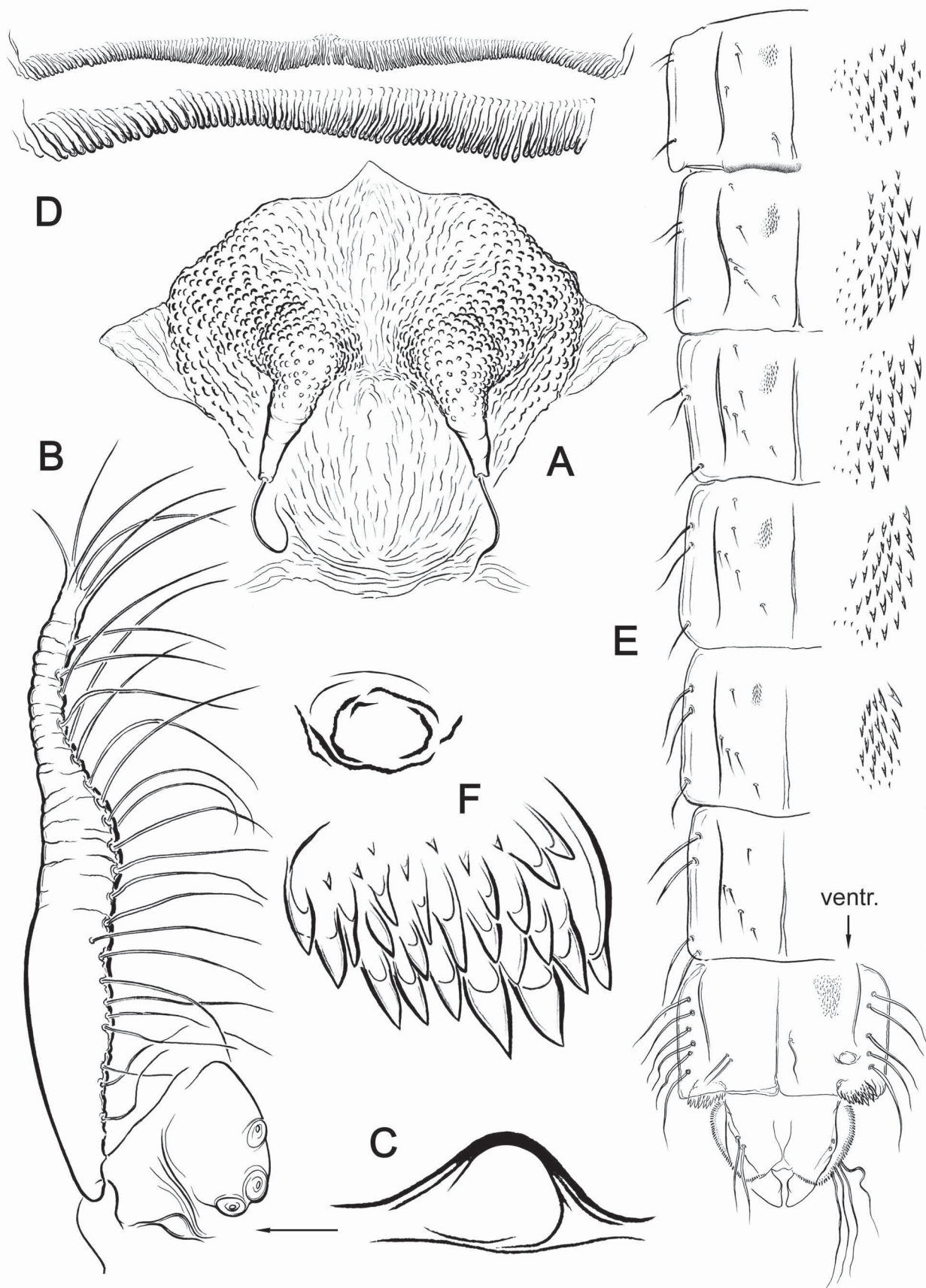


FIGURE 3. *Cladotanytarsus* (*Lenziella*) *bicornutus* (Kieffer, 1922), pupa. A: frontal apotome; B: thoracic horn, pre-corneal swelling and tubercle; C: pre-corneal tubercle (magnified); D: row of hooks on abdominal tergite II and its magnified part; E: abdomen and spine patches of tergites II–VI (magnified); F: ventral tubercle and posterolateral comb of segment VIII.

Cladotanytarsus (Lenziella) amandus Hirvenoja, 1962

(Figures 4, 15A)

Cladotanytarsus amandus Hirvenoja, 1962: 176 (adult male, fig. 1b; Finland); Przhiboro & Sæther 2011: (adult male, fig. 9; Russia).

Materials examined

FINLAND. Kuusamo distr., Lake Ala Kitka near Kantojoki, 1 August 2002, 2 males, W. Giłka. Utsjoki distr., Kaldoaivi area, Aksonjunni, 36 km south of Nuorgam, 20 July–28 August 2007, 1 male, J. Salmela (from L. Paasivirta's coll.). Type material unavailable. Holotype photographed (Fig. 4).

Diagnostic description

Male ($n = 3$; dimensions in Tables 2 and 8).

Colouration (in alcohol). Antennal pedicel, tentorium, scutal stripes, distal half of postnotum and sternum dark brown. Antennal flagellum, scutellum and legs brown. Head capsule, ground colour of thorax and haltere olive green. Abdominal segments olive brown, with posterior margins somewhat darker. Wing membrane with brownish undertone; C, M and radial veins distinctly darker.

Head. Antenna with 13 well-separated flagellomeres. Plume fully developed. Frontal tubercles relatively stout, cylindrical. Palp variable in length; intermediate form as in Fig. 15A.

Wing. Usual in shape, slender. C, R, distal half of M_{1+2} ($n = 3$) and short distal part of R_1 and R_{4+5} ($n = 1$) bearing macrotrichia. Membrane with short row of macrotrichia in distal section of r_{4+5} and with few macrotrichia in apical part of m_{1+2} . Remaining veins and cells bare. FCu slightly distal of RM. R_{4+5} ending slightly distally of M_{3+4} and well proximally of M_{1+2} .

Legs. Slender. Tibial spur of fore leg straight or slightly curved (Fig. 4A). Tibial spurs of mid and hind legs variable in shape, short and slightly curved or broad at base and strongly bent, double or single; combs variable in size and in number of teeth, vestigial (Fig. 4B–E, Table 8). Tibial apices of middle and hind leg enlarged, bearing relatively short and strongly curved setae (Fig. 4B–E). For lengths of leg segments see Table 2.

TABLE 2. Lengths (μm) of leg segments of male *Cladotanytarsus (L.) amandus* Hirvenoja, 1962.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	590–690 (625)	425–470 (440)	550–715 (635)	285–395 (345)	220–315 (270)	155–215 (180)	105–125 (115)
p ₂	615–705 (650)	515–610 (550)	235–310 (275)	145–200 (175)	105–145 (125)	80–110 (95)	75–95 (85)
p ₃	700–810 (745)	735–840 (770)	410–490 (450)	280–315 (290)	245–280 (255)	160–190 (175)	110–125 (115)

Hypopygium (Fig. 4F–K). Gonostylus slender, shorter than gonocoxite. Anal tergite with V-type bands. Anal point stout, parallel-sided or finely narrowed in median part and somewhat lanceolate, with small nipple-like tip and/or apically pointed, bearing well developed crests, distinct spinulae and minute tubercles ventrally; microtrichia-free area surrounding base of anal point extensive. Superior volsella rounded at base, with distal half strongly narrowed and finely swollen apically; basal half covered with dense microtrichia. Digitus long, with slightly bent finger-like tip. Long inner setae placed on small protuberance at base of superior volsella (Fig. 4F–H). Stem of median volsella straight or slightly curved and directed laterally, bearing 5–6 long furcate lamellae (Fig. 4I, J). Inferior volsella relatively broad, parallel-sided, apically rounded, with distinct dorsomedian ridge and globular swelling well-visible in ventral aspect (Fig. 4F, H, K).

Adult female, pupa and larva: unknown.

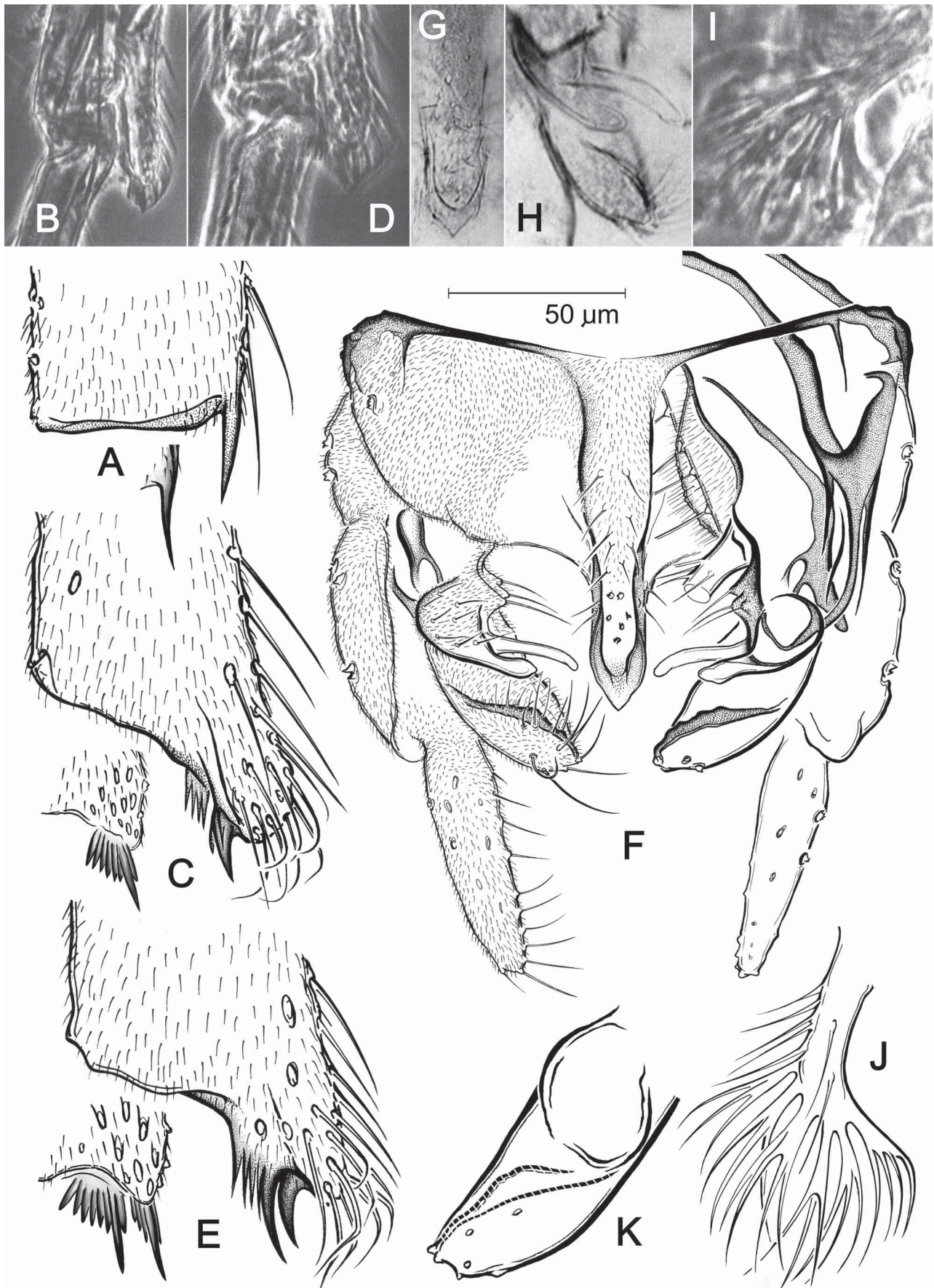


FIGURE 4. *Cladotanytarsus* (*Lenziella*) *amandus* Hirvenoja, 1962, male. A–E: tibial apices of fore leg (A), middle leg (B, C) and hind leg (D, E) (variation); F: hypopygium; G: anal point; H: superior volsella, digitus and inferior volsella; I, J: median volsella (magnified x 1.5 relative to hypopygium); K: inferior volsella with ventral swelling. B, D, G, H, I: holotype (photos of J.E. Sublette's collection).

Remarks

The original description of *Cladotanytarsus amandus*, with the illustration attached, contains no information on characters which could be helpful in the inclusion of the species into *Lenziella* (Hirvenoja 1962). Unfortunately, the type material is not available (Laiho, pers. comm.). However, the records collected for this study clearly show that the species does belong to *Lenziella*. The specimens examined fit the holotype of *C. amandus* (photographed in Fig. 4), and their dimensions are well comparable with those given in the original description. The adult male shows enlarged tibial apices, the tibial combs and spurs are reduced and/or modified (Fig. 4B–E), and the inferior volsella features ventrally a globular swelling (Fig. 4K). *C. (L.) amandus* is easily separable from other members of the subgenus by its metrics, colouration, and the highly specific hypopygial characters [see also Przhiboro and Sæther (2011)].

Hirvenoja (l.c.) recorded *C. (L.) amandus* at Sompiojärvi (at present a part of the Lokka reservoir) and Posolampi, both being mesotrophic shallow lakes near Sodankylä in central Lapland. The specimens examined in this study were sampled at the northern and southern borders of Finnish Lapland, at eutrophic fens, spring brooks, and lakes, which presumably are the preferred larval habitat (Paasivirta, pers. comm.). Ecology of the species was not known in detail until the recently published record from the upper littoral of a small oligotrophic lake in northern Karelia (Przhiboro & Sæther 2011).

Cladotanytarsus (Lenziella) cruscus (Sæther, 1971)

(Figures 5–7, 15E)

Lenziella cruscus Sæther, 1971: 1825 (adult male, figs 13f, 14–16; pupa, fig. 17; larva, fig. 18; USA); Sæther 1977: 139, 140, 144, 149 (adult female, fig. 66e–g).

Cladotanytarsus (Lenziella) cruscus: Sublette & Sublette 1979: 92 (combination).

Cladotanytarsus cruscus: Oliver *et al.* 1990: 55 (in catalogue).

Materials examined

USA. CALIFORNIA. Riverside Co. Salton Sea area, Mecca, 22 May 1970, 2 males; 2 km SE of Oasis, 13 June 1967, 1 male; Thermal, 15 May 1970, 1 male; G. Grodhaus. NEVADA. Washoe Co. Pyramid Lake, 10 October 1981, 1 Pex, 1 male, 1 female, D.L. Abell. NEW MEXICO. Catron Co. Gila River below Snow Lake, 30 July 1992, 3 males, R. Castell. Colfax Co. Canadian River: Taylor Springs, 15 July 1976, 3 males, 3 August 1976, 2 larvae, 2 Pex, 2 females, M. Beard; 27 km S of Raton, 25 June 1992, 1 Pex, M. Hatch. De Baca Co. Alamogordo near Sumner Lake, 15 October 1961, 1 male, 28 September 1974, 1 male, J.E. Sublette. Eddy Co. Carlsbad, 18 June 1973, 3 males, G.R. Gilbert. Pecos River: above Delaware River confl., 8 June 1992, 1 Pex, R. Castell, 6 August 1992, 1 male, J.W. Saunders; 30 km S of Malaga, 12 October 1974, 1 male, J.E. Sublette; Harroun Crossing, 3 January 1978, 1 larva, 1 male, J.E. Sublette, 22 March 1978, 3 males, M. Beard, 1 May 1978, 1 male, T. Best, 30 November 1979, 1 pharate male, J.E. Sublette; Pierce Canyon, 5 January 1978, 2 larvae, J.E. Sublette. Sandoval Co. Rio Grande below Cochiti Dam, 4 September 1991, 1 male, 30 September 1992, 1 male, J.E. Sublette. SOUTH DAKOTA. Charles Mix Co. Lake Francis Case, Platte Bay, 17–24 August 1967, 2 males, P. Hudson. Yankton Co. Lewis and Clark Lake near Springfield, 13–17 July 1964, 1 male, 4 September 1964, 1 Pex, 1 pharate male, 23 October 1964, 1 Pex, 1 pharate male, 13 February 1969, 11 larvae, 13 Pex, 3 males (incl. 2 pharate), 10 females (incl. 3 pharate), 10 May 1971, 1 Pex, 1 male, 20 May 1971, 1 Pex, 1 female, P. Hudson.

Diagnostic description

Adult male, pupa and larva were described based on four exemplars (Sæther 1971), and the reconstructed illustrations of female were primarily based on a damaged specimen (Sæther 1977). This study provides a complete redescription of adults and pupa, based on new records.

Male (n = 35, incl. 5 pharate specimens; dimensions in Tables 3 and 8).

Colouration (slide-mounted specimens). Antenna, tentorium, scutal stripes, scutellum, postnotum, sternum, and legs greenish brown to dark brown. Remaining body parts yellowish green. Wing membrane transparent with light greenish undertone; C, M and radial veins slightly darker.

Head. Antenna composed of 13 flagellomeres. Plume fully developed, but setae sparse or plume strongly reduced and antenna similar to that illustrated in Fig. 2A. Frontal tubercles variable in size, usually stout, subconical, apically rounded. Palp strongly shortened, somewhat variable in length; intermediate form as in Fig. 15E.

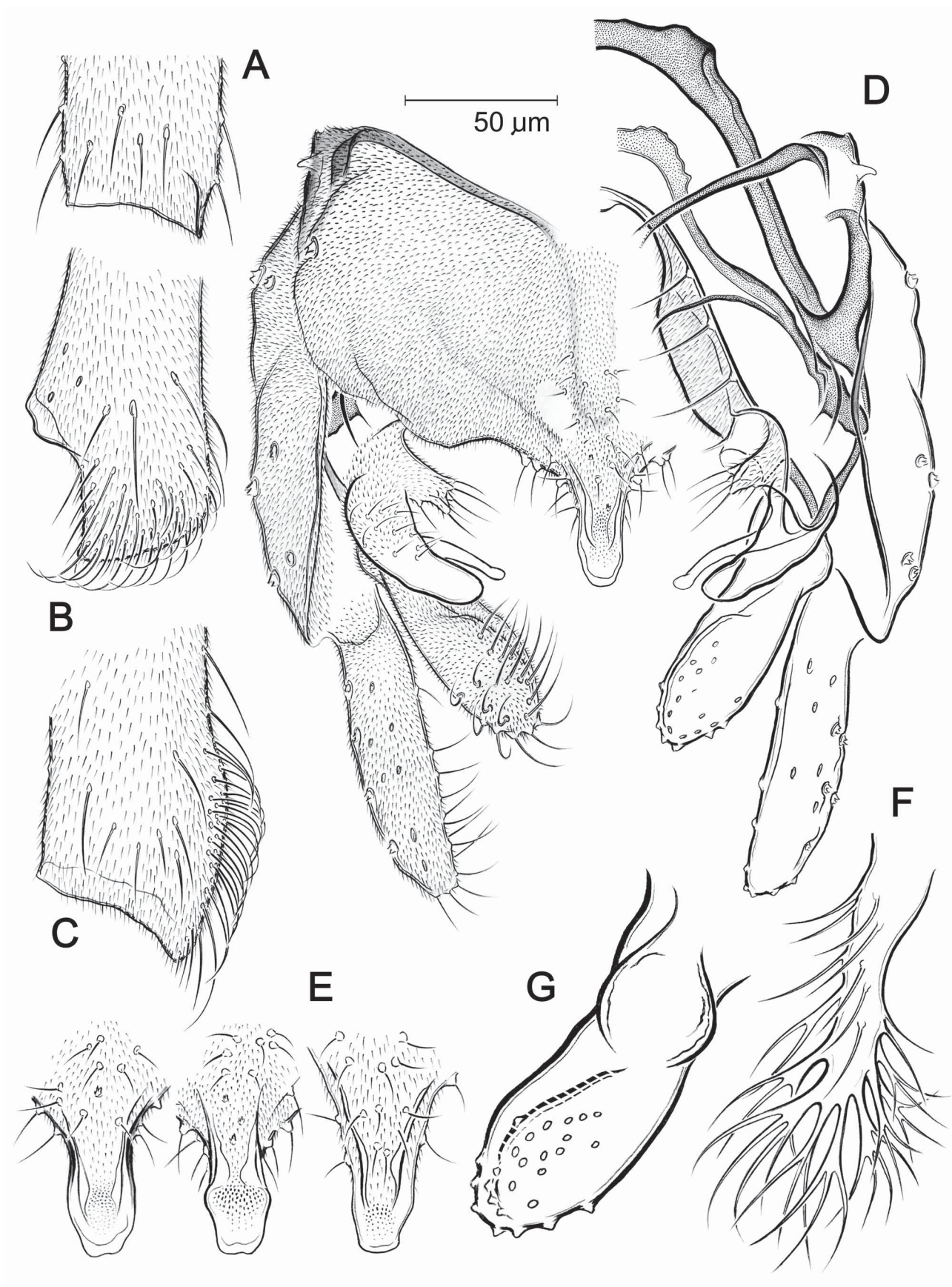


FIGURE 5. *Cladotanytarsus (Lenziella) cruscus* (Sæther, 1971), male. A–C: tibial apices of fore leg (A), middle leg (B) and hind leg (C); D: hypopygium; E: anal point (variation); F: median volsella (magnified x 1.5 relative to hypopygium); G: inferior volsella with ventral swelling.

Wing. Reduced in anal section and relatively broad in median part. Macrotrichia only on wing margin, all veins except costa bare, membrane completely bare. Venation as in original description (Sæther 1971, fig. 15A).

Legs. Stout, distinctly shortened. Tibial spurs and combs absent. Tibial apices of middle and hind leg distinctly enlarged, bearing dense and curved setae; setae of hind tibia arranged in 2–3 rows (Fig. 5B, C). Penultimate tarsomere in middle leg somewhat cordiform, shorter than ultimate. For lengths of leg segments see Table 3.

TABLE 3. Lengths (µm) of leg segments of male *Cladotanytarsus (L.) cruscus* (Sæther, 1971).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	470–745 (555)	335–470 (390)	390–565 (450)	220–270 (235)	170–220 (190)	125–155 (135)	90–120 (105)
p ₂	355–480 (405)	295–425 (350)	140–235 (180)	70–100 (85)	50–65 (55)	40–60 (45)	50–65 (55)
p ₃	475–715 (575)	425–630 (535)	235–345 (285)	170–235 (200)	150–205 (180)	90–130 (110)	70–115 (90)

Hypopygium (Fig. 5D–G). Gonostylus straight or slightly curved, widely rounded apically. Anal tergite with V-type bands. Wide apodeme (branched phallapodeme?) forming bridge under transverse sternapodeme. Anal point variable in shape, subtriangular or somewhat club-shaped, with broadly rounded, transversely cut or slightly concave apex, bearing few small spinulae or spinulae absent and replaced with setae; small microtrichia-free area surrounding base of anal point (Fig. 5D, E). Superior volsella stout, rounded at base, tapering toward slightly swollen and widely rounded apex, with dense microtrichia in proximal half. Digitus moderately long, extending beyond apex of superior volsella. Short inner setae (4–6) placed on prominent lobe at base of superior volsella (Fig. 5D). Stem of median volsella stout and long, straight or slightly curved and directed posteromedially, bearing 6–7 furcate lamellae (Fig. 5F). Inferior volsella robust, reaching over half length of gonostylus, swollen in distal part, apically rounded, with distinct globular swelling ventrally (Fig. 5D, G).

Female (n = 14, incl. 3 paratype specimens; dimensions in Table 4).

Colouration. As in male.

Head. Antenna with 4 or 5 flagellomeres (proximal flagellomeres slightly separated); AR 0.58–0.75 (0.63). Frontal lobes with broad conical projections bearing minute (5–8 µm), as long as wide tubercles apically. Palp similar to that found in male, variable in length but always strongly shortened; lengths of palpomeres 2–5 (µm): 16–24 (19), 22–32 (27), 22–40 (31), 36–75 (52). Clypeus with 16–25 setae.

Thorax chaetotaxy. Ac 1–4, exceptionally 7 (n = 1); Dc 1–2 or absent (n = 3), Pa 1–2, Scts 2–4.

Wing. As in male. Macrotrichia on wing margin only; all veins except costa bare, exceptionally a few setae in distal section of R₁ and R₄₊₅. Membrane completely bare. Wing length 0.91–1.12 (0.99) mm.

Legs. As in male. Tibial spurs and combs absent. Tibial apices of middle and hind leg distinctly enlarged. Fore and middle leg with fourth tarsomere shorter than fifth. For lengths of leg segments and leg ratios see Table 4.

TABLE 4. Lengths (µm) of leg segments and leg ratios of female *Cladotanytarsus (L.) cruscus* (Sæther, 1971).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR
p ₁	315–395 (350)	255–330 (290)	250–340 (290)	100–130 (115)	65–90 (75)	45–65 (55)	60–75 (65)	0.92–1.06 (0.99)
p ₂	310–355 (325)	280–355 (305)	125–170 (145)	60–80 (65)	35–50 (45)	30–45 (35)	40–50 (45)	0.44–0.50 (0.48)
p ₃	365–510 (405)	350–500 (405)	160–265 (205)	90–155 (120)	65–140 (100)	45–90 (60)	50–75 (60)	0.44–0.53 (0.50)

Genitalia (Fig. 6). Gonocoxite with 1–2 setae. Tergite IX subtriangular to triangular, with 11–14 setae, lateral teeth usually absent or weak. Sternite VIII with 28–31 stout setae in posteromedian position and 8–10 weaker setae placed in longitudinal rows under vaginal floor close to median vaginal margins. Gonapophysis VIII single-lobed, extensive, caudomedian margins broadly rounded, converging to moderately wide floor covering about one-sixth of anterior part of vagina, with dense and numerous microtrichia directed medially (Fig. 6B). Rami robust, tapering to strong, 75–84 (79) μm long notum. Labia wide, with parallel posteromedian margins, broadly rounded caudally, protruding beyond posterior margin of SVIII. Gonocoxapodeme almost straight or slightly curved. Coxosternapodeme angular, with median lobes connected by sinuous transverse bridge. Seminal capsules ovoid, subequal in size, larger 48–63 (54) μm long and 38–44 (40) μm wide, smaller 44–58 (48) μm long and 35–38 (36) μm wide, with necks in posterolateral position; spermathecal ducts strongly curved, 160–180 (165) μm long. Postgenital plate subtriangular. Cercus 65–75 μm long, roundish, with dorsomedian lobe extending slightly beyond ventromedian margin at most.

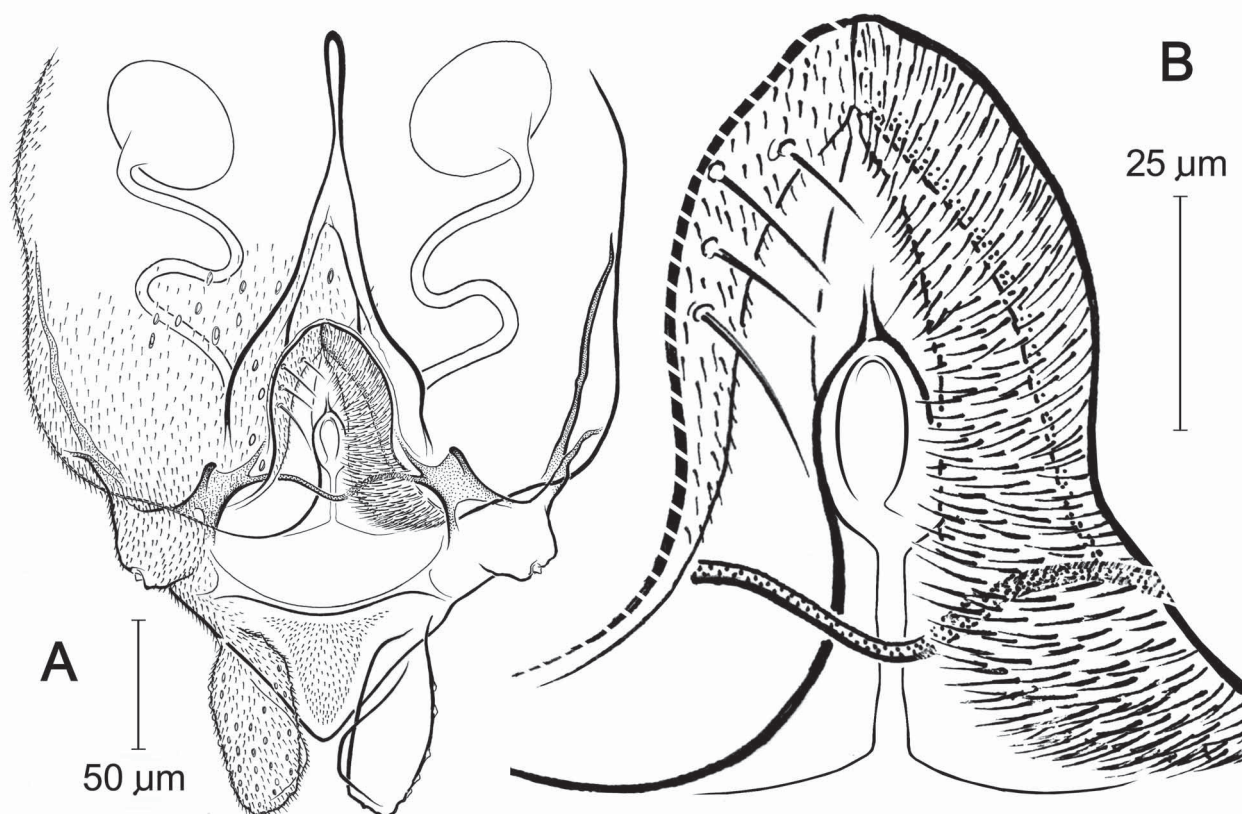


FIGURE 6. *Cladotanytarsus* (*Lenziella*) *crusculus* (Sæther, 1971), female. A: genitalia, B: gonapophysis VIII, labia and coxosternapodeme bridge (magnified).

Pupa (exuviae, $n = 22$).

Length. 2.6–3.1 (2.9) mm.

Colouration (slide-mounted specimens). Pale yellowish.

Cephalothorax. Frontal apotome with stout conical cephalic tubercles, 32–44 (40) μm long, each with seta about twice as long as tubercle; extensive fields of granulate sculpture covering bases of tubercles and apotome anterolaterally (Fig. 7A). Thoracic horn subtriangular, widest at mid-length, relatively small, 36–55 (45) μm long, with elongate cylindrical basal lobe and 12–20 chaetae placed apicolaterally, longest chaeta c. 2.0–2.5 as long as horn; precorneal swelling with 3 setae; precorneal tubercle hemispherical, 7–8 μm high and 12–15 μm wide, placed between basal lobe and precorneal swelling (Fig. 7B, C). Thorax with narrow median patch of c. 30–45 small spinules becoming minute points posteriorly. Nose of wing sheath usually not developed or slightly projecting (c. 3 μm) beyond posterior margin of sheath.

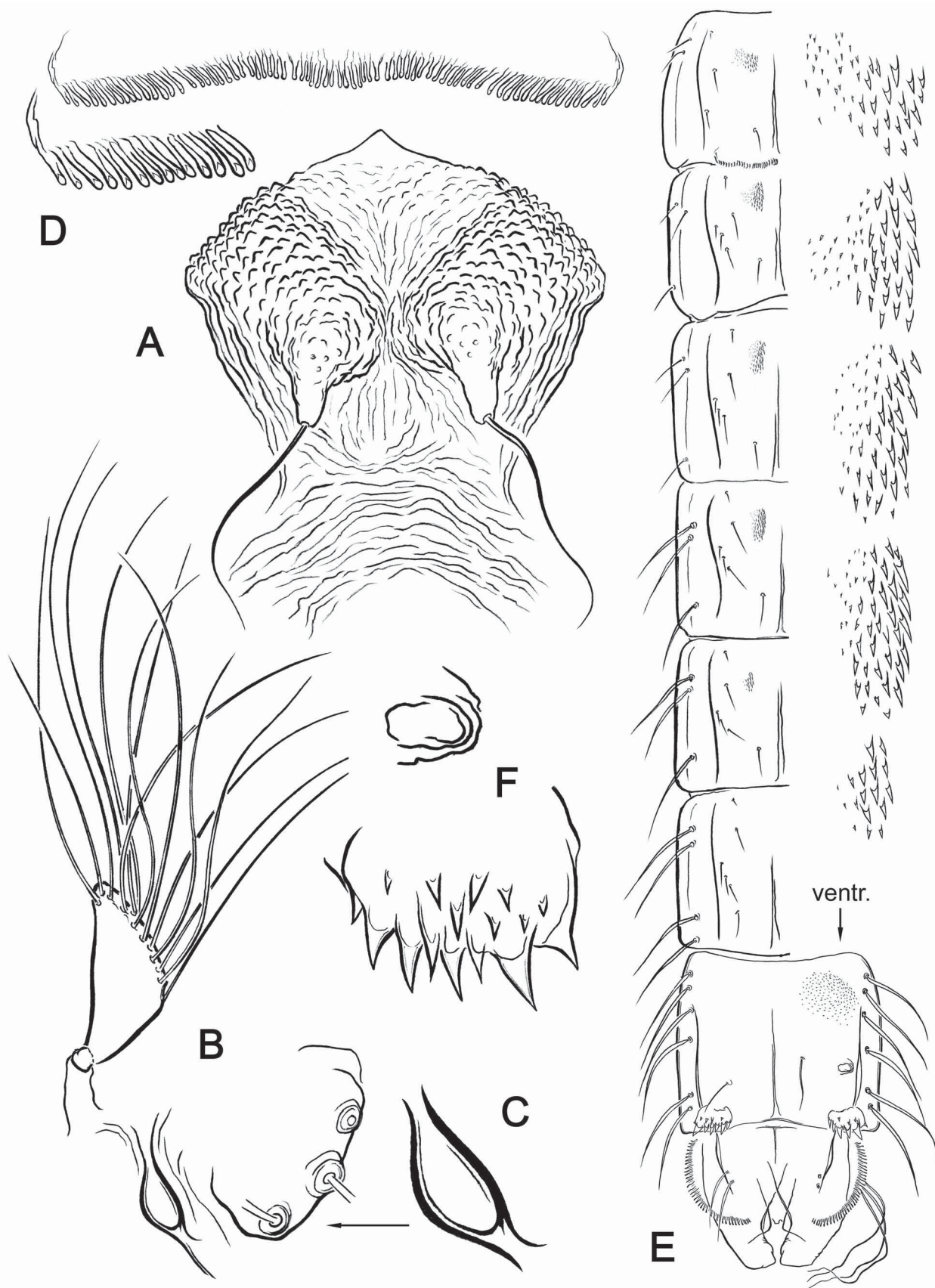


FIGURE 7. *Cladotanytarsus* (*Lenziella*) *cruscus* (Sæther, 1971), pupa. A: frontal apotome; B: thoracic horn, pre-corneal swelling and tubercle; C: precorneal tubercle (magnified); D: row of hooks on abdominal tergite II and its magnified part; E: abdomen and spine patches of tergites II–VI (magnified); F: ventral tubercle and posterolateral comb of segment VIII (typical form).

Abdomen. TI–VIII with sublateral bands. Tergite patches relatively extensive for the subgenus, each consisting of spines becoming spinulate shagreen laterally, with microspinulae/points placed in irregular rows/clusters or arranged evenly; TII patch broad, with extensive field of microspinulae laterally, TIII patch subtriangular, TIV and TV patches elongate, twice as long as wide, TVI patch small, oval; TI and TVII without patches (Fig. 7E). TII hook row c. 250 μm long, 0.5–0.6 of TII width, composed of 70–85 hooklets (Fig. 7D). Pedes spurii A absent, pedes spurii B vestigial. Posterolateral comb of segment VIII stout, 44–60 (52) μm wide, with 7–12 claw-like teeth and 4–8 smaller spines (Fig. 7F). SVIII with oval shagreen anterolaterally and with single-lobed, 10–15 μm wide tubercle in posterolateral position. Taeniate L-setae on segments V–VIII arranged as follows: 2 + 1; 2 + 1; 2 + 2 or 2 + 1; 3 + 2 or 4 + 2 or 6 equidistant on each side. Anal lobe with 2 dorsal setae and fringe composed of 30–38 taeniate setae per side (Fig. 7E).

Larva

The specimens examined (head capsules and remains of exuviae) are fully consistent with the original description. For details see Sæther (1971). This is the only known larva in the subgenus. It falls into the antithesis of couplet 2 (the *mancus* group) in the key to species groups of *Cladotanytarsus* (Pinder & Reiss 1983). Conclusions on diagnostics for larvae of the genus, however, seem untimely, particularly that most of *Cladotanytarsus* larvae have been inadequately described or are unknown (op. cit.).

Remarks

Cladotanytarsus (*L.*) *crusculus* and *C. (L.) latissimus* are presumably the closest related species which resemble each other in terms of the most important diagnostic structures (see remarks for *C. latissimus* and Table 8). The data collected for this study indicate that *C. (L.) crusculus* can dwell in both lentic and lotic freshwater habitats.

Cladotanytarsus (*Lenziella*) *latissimus* sp. nov.

(Figures 8–10, 15F)

Type material

Holotype. Male. USA, FLORIDA, Polk Co. Lake Cannon in Winter Haven, 22 November 1967, leg. R.A. Crossman. Paratypes. 5 males as holotype; Lake Cannon, 16 December 1968, 1 Pex, 2 males (incl. 1 pharate), 18 December 1968, 3 Pex, 3 males (incl. 2 pharate), 1 pharate female, 20 December 1968, 3 Pex, 6 males (incl. 2 pharate), 2 January 1969, 1 male, 13 July 1970, 2 Pex, 2 pharate males, 12 October 1970, 1 Pex, 1 pharate female; Lake Cannon & Lake Ruby near Winter Haven, 5 August 1970, 1 Pex, 1 pharate male; Lake Ruby, 2 December 1968, 2 Pex, 2 pharate males, 2 January 1969, 3 Pex, 1 pharate male, 1 male abdomen, 1 pharate female, 12 October 1970, 1 Pex, 1 pharate female, 23 November 1970, 1 male. R.A. Crossman.

Etymology

The specific name, derived from Latin word meaning *the broadest*, refers to the unusual shape of the hypopygial anal point.

Diagnosis

Adults (both sexes). Palp strongly shortened. Tibial apices of middle and hind leg enlarged, with dense but short setae; hind tibia with single stout bristle apically; spurs and combs absent. **Male.** Antennal plume reduced, setae sparse and short. Anal point unusually broad, trapezoid, tapering to transversely cut or widely rounded apex, bearing few small spinulae or spinulae absent and replaced with setae. Digitus short, covered with minute serrations. Inferior volsella robust, bearing large ball-shaped and distinctly wrinkled ventral swelling. **Female.** Sternite VIII with several setae placed in longitudinal rows under wide vaginal floor, close to median margins or directly on vaginal margin. Gonapophysis VIII relatively weak. Labia wide, with posteromedian margins concave or irregularly rounded, distinctly protruding beyond posterior margin of SVIII. **Pupa.** Cephalic tubercles large, with setae twice as long as tubercle; granulate sculpture covering bases of tubercles and anterior half of frontal apotome. Thoracic horn club-shaped, with darkly coloured basal part. Tergite patches with spinulate shagreen laterally, microspinulae/points arranged evenly; TII patch broad, with extensive field of microspinulae laterally, TIII–V patches subtriangular, TVI patch small, oval.

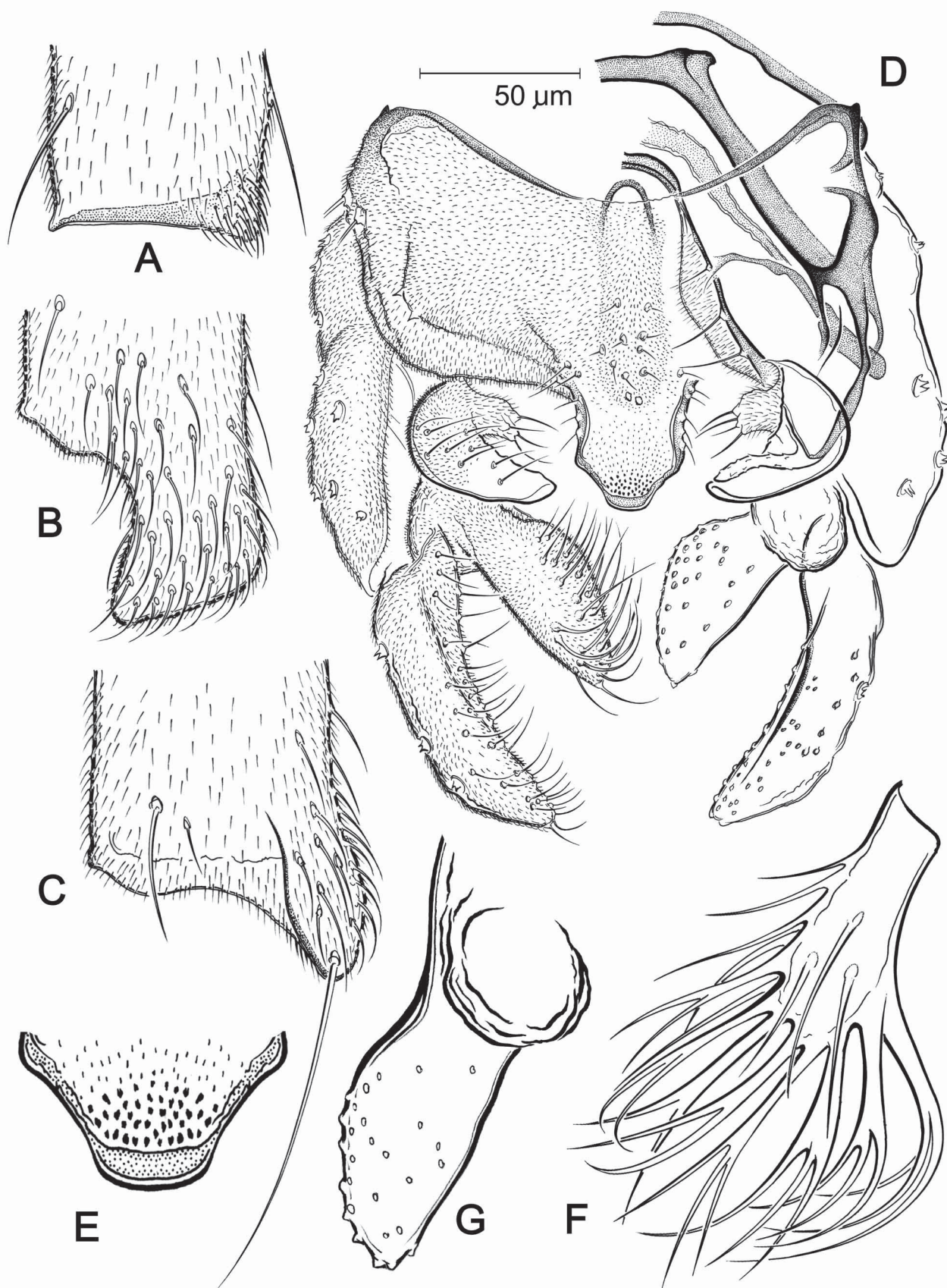


FIGURE 8. *Cladotanytarsus* (*Lenziella*) *latissimus* sp. nov., male. A–C: tibial apices of fore leg (A), middle leg (B) and hind leg (C); D: hypopygium; E: distal portion of anal point (magnified); F: median volsella (magnified x 2 relative to hypopygium); G: inferior volsella with ventral swelling.

Description

Male (n = 25, incl. 12 pharate specimens and 1 male abdomen; dimensions in Tables 5 and 8).

Colouration (slide-mounted specimens). Antenna, tentorium, scutal stripes, postnotum, sternum and legs greenish to pale brown. Remaining body parts yellowish green. Wing membrane transparent with light greenish undertone; C, M and radial veins slightly darker.

Head. Antenna composed of 13 well separated flagellomeres. Plume reduced, setae sparse and short (antenna similar to that illustrated in Fig. 2A). Frontal tubercles variable in size, usually subconical. Palp strongly shortened, somewhat variable in length; intermediate form as in Fig. 15F.

Wing. Weakly preserved in specimens examined. Distinctly reduced in anal section and relatively broad in median part. Wing margin with macrotrichia on 2/3 of distal part, all veins except distal half of costa bare, membrane completely bare.

Legs. Stout, distinctly shortened. Tibial spurs and combs absent. Tibial apices of middle and hind leg enlarged, bearing dense but short setae (Fig. 8B, C). Hind tibia with single strong bristle apically (length: 50–75 µm) (Fig. 8C). Penultimate tarsomere in middle leg somewhat cordiform, shorter than ultimate; second tarsomere of hind leg shorter than third. For lengths of leg segments see Table 5.

TABLE 5. Lengths (µm) of leg segments of male *Cladotanytarsus* (L.) *latissimus* sp. nov.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	440–615 (505)	330–440 (360)	395–530 (440)	205–285 (225)	170–220 (180)	130–185 (145)	100–145 (120)
p ₂	315–435 (355)	295–375 (315)	130–175 (145)	50–65 (60)	35–50 (45)	30–40 (35)	40–55 (45)
p ₃	450–615 (500)	375–500 (410)	190–250 (215)	110–145 (120)	115–150 (125)	50–75 (60)	50–65 (55)

Hypopygium (Fig. 8D–G). Gonostylus somewhat boomerang-shaped, with distal part directed posteromedially. Anal tergite with V-type bands. Wide apodeme (branched phallapodeme?) forming bridge under transverse sternapodeme. Anal point extraordinarily broad, trapezoid, tapering to transversely cut or widely rounded apex bearing few small spinulae or spinulae absent and replaced with setae; numerous tubercles forming an ornament on ventral side of anal point; entire area surrounding base of anal point covered with microtrichia (Fig. 8D, E). Superior volsella rounded at base, regularly tapering toward blunt apex, with dense microtrichia in proximal half. Digitus short, reaching apex of superior volsella at most, covered with minute serrations (visible at magnification x500+). Short inner setae placed on prominent lobe at base of superior volsella (Fig. 8D). Stem of median volsella stout, club-shaped, straight, directed posteromedially, bearing 7–8 long furcate lamellae (Fig. 8F). Inferior volsella robust, reaching over half length of gonostylus, swollen at mid-length, bearing large ball-shaped and distinctly wrinkled swelling ventrally (Fig. 8D, G).

Female (pharate, n = 4).

Colouration. Indefinable in pharate specimens examined (apparently as in male).

Head. Antenna with 4 or 5 flagellomeres (proximal part of flagellum indistinctly segmented). Frontal lobes bearing minute conical tubercles apically. Palp similar to that found in male, strongly shortened, with 3–4 indistinctly separated palpomeres. Clypeus with 12–15 setae.

Thorax chaetotaxy. Setae weak and/or indistinct; Ac unobservable, Dc 3–5, Pa 1, Scts 2.

Wing. Poorly observable inside pupal sheaths.

Legs. As in male. Tibial spurs and combs absent. Tibial apices of middle and hind leg distinctly enlarged. Hind tibia with single strong bristle apically.

Genitalia (Fig. 9). Variable. Gonocoxite with 2–3 setae. Tergite IX subtriangular, with 7–11 setae, lateral teeth weak or absent. Sternite VIII with 23–33 stout setae in posteromedian position and 7–12 weaker setae placed in longitudinal rows under vaginal floor close to median margins (Fig. 9A, C) or directly on vaginal margins (Fig. 9B, D). Gonapophysis VIII single-lobed, relatively weak, caudomedian margins rounded, covered with dense long microtrichia and converging to moderately wide floor under anterior part of vagina (Fig. 9A, C) or caudomedian

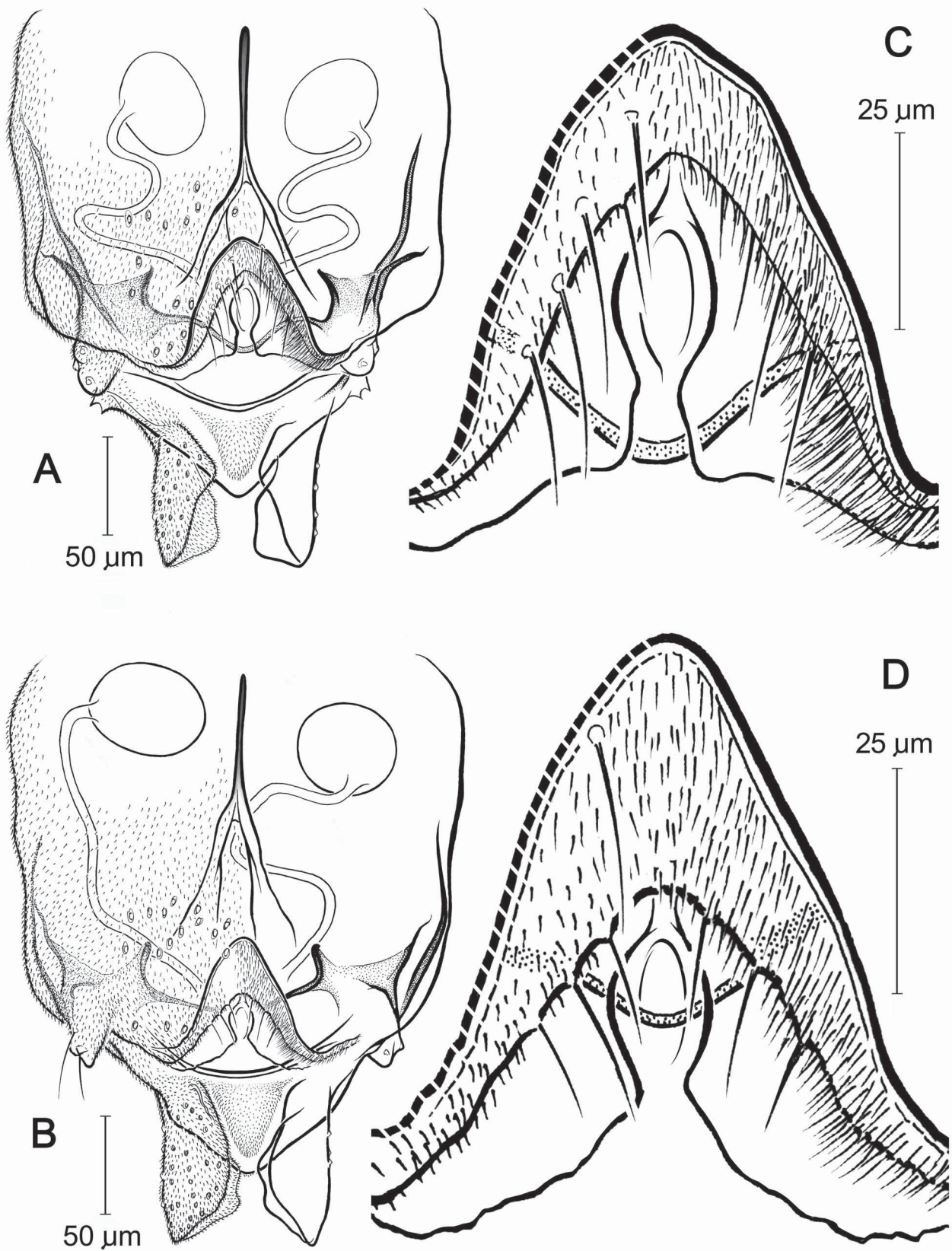


FIGURE 9. *Cladotanytarsus* (*Lenziella*) *latissimus* sp. nov., variation in female genitalia. A, B: genitalia; C, D: gonapophysis VIII, labia and coxosternapodeme bridge (magnified). A, C: typical form; B, D: variation.

margins bearing relatively short sparse microtrichia and vaginal floor large, covering nearly half of vagina (Fig. 9B, D); microtrichia directed posteromedially. Rami stout, tapering to slender, 72–87 (77) μm long notum. Labia wide, with posteromedian margins slightly concave or irregularly rounded, distinctly protruding beyond posterior margin of SVIII. Gonocoxapodeme curved. Coxosternapodeme stout, angular, with median lobes connected by sinuous or V-shaped transverse bridge. Seminal capsules ovoid, subequal in size, larger 48–56 (50) μm long and 36–46 (39) μm wide, smaller 44–50 (47) μm long and 38–45 (41) μm wide, with necks in posterolateral position; spermathecal ducts strongly curved, 140–200 (160) μm long. Postgenital plate subtriangular. Cercus 70–85 μm long, variable in shape, cuneiform, with concave dorsomedian lobe usually extending well beyond ventromedian margin.

Pupa (exuviae, $n = 17$).

Length. 2.5–3.1 (2.8) mm.

Colouration (slide-mounted specimens). Pale yellowish. Base of thoracic horn dark brown or black.

Cephalothorax. Frontal apotome with large conical cephalic tubercles, 32–45 (37) μm long, each with seta about twice as long as tubercle; extensive fields of granulose sculpture covering bases of tubercles and anterior half of apotome (Fig. 10A). Thoracic horn club-shaped, widest at mid length, relatively small, 32–52 (42) μm long, with elongate cylindrical basal lobe and 8–12 chaetae placed in apical part, longest chaetae c. 1.5–2.0 as long as horn; precorneal swelling with 3 setae; precorneal tubercle hemispherical, 8–12 μm high and 13–15 μm wide, placed between basal lobe and precorneal swelling (Fig. 10B). Thorax with narrow median patch of c. 50–70 small spinules becoming minute points posteriorly. Wing sheath with small nose, slightly projecting (4–8 μm) beyond posterior margin.

Abdomen. TI–VIII with sublateral bands. Tergite patches extensive, each consisting of long spines becoming spinulate shagreen laterally, with microspinulae/points arranged evenly; TII patch broad, with extensive field of microspinulae laterally, TIII–V patches subtriangular, TVI patch small, oval; TI and TVII without patches (Fig. 10D). TII hook row c. 180–210 μm long, 0.45–0.55 of TII width, composed of 70–90 hooklets (Fig. 10C). Pedes spurii A absent, pedes spurii B vestigial or weak. Posterolateral comb of segment VIII stout, 40–52 (46) μm wide, with 7–12 teeth and 0–5 smaller spines; shape and arrangement of teeth variable (Fig. 10E, F). SVIII with subtriangular shagreen anterolaterally and with single- or bi-lobed, 15–20 μm wide tubercle in posterolateral position. Taeniate L-setae on segments V–VIII arranged as follows: 2 + 1; 2 + 1; 2 + 2; 2 + 3 or 4–5 equidistant on each side. Anal lobe with 2 dorsal setae and fringe composed of 25–35 taeniate setae per side (Fig. 10D).

Larva: unknown.

Remarks

Due to several unusual characters found in male and pupa, *Cladotanytarsus* (*L.*) *latissimus* is one of the most distinct and easily identifiable species in the genus and in the tribe (see diagnosis). In contrast, the female genitalia show considerable variability (Fig. 9), so identification of females should be based both on genital apparatus and leg structures.

The closest known species is *C. (L.) cruscus* that has similarly developed antennae (plume usually reduced in male), palp (strongly shortened in both sexes), legs (combs and spurs absent in both sexes), and hypopygium (spinulae small or replaced with setae, large prominent lobe bearing inner setae) (cf. Figs 5 and 8). The character that separates the two species the best is the shape of anal point in male of *C. (L.) latissimus* (Fig. 8D, E), the presence of the long bristle placed on apex of hind tibia (Fig. 8C) in both sexes, and the structure of frontal apotome and thoracic horn in pupa (Fig. 10A, B).

C. (L.) latissimus is a limnophilous species.

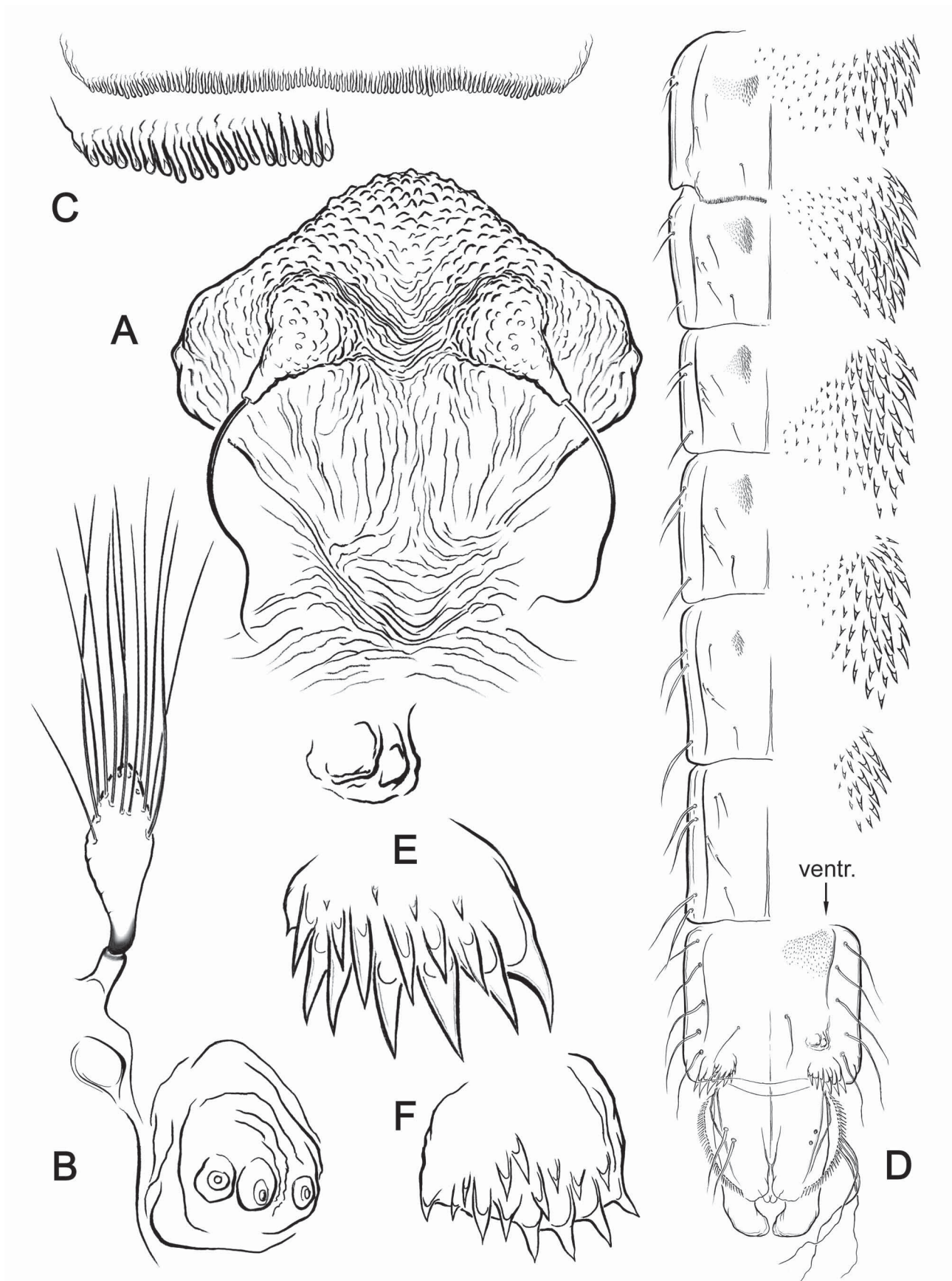


FIGURE 10. *Cladotanytarsus* (*Lenziella*) *latissimus* sp. nov., pupa. A: frontal apotome; B: thoracic horn, precorneal swelling and tubercle; C: row of hooks on abdominal tergite II and its magnified part; D: abdomen and spine patches of tergites II–VI (magnified); E, F: ventral tubercle and posterolateral comb of segment VIII: typical shape (E), variation (F).

***Cladotanytarsus (Lenziella) piniger* sp. nov.**

(Figures 11, 15C)

Tanytarsus viridiventris Malloch, 1915: Darby 1962: 39, 101, 175, 177 (misidentification?; biology, USA).

Cladotanytarsus viridiventris (Malloch): Bilyj & Davies 1989: 949 (pupa, in key).

Type material

Holotype. Male. USA, CALIFORNIA, Calaveras Co. New Hogan Lake, 5 September 1967, leg. G. Grodhaus. Paratypes. 6 males as holotype; Amador Co. Amador Lake, 20 June 1968, 13 males, E.J. Sherman & J. Prine. Contra Costa Co. Concord, 27 September 1952, 1 male, W.R. Kellen. Kern Co. Buttonwillow, 31 July 1964, 1 male, R.L. Nelson; Isabella Lake, 23 June 1959, 2 males, G. Grodhaus. Los Angeles Co. Calabasas, Calabasas Lake, 4 September 1973, 4 males, M.S. Mulla; Victorville, Spring Valley Lake, 11 September 1973, 6 males, M.S. Mulla. Merced Co. O'Neil Forebay near Los Banos, 18 August 1967, 3 males, G. Grodhaus. Riverside Co. Hemet, 9 June 2000, 4 males, 18 May 2001, 1 male, W.E. Walton; Philip L. Boyd Deep Canyon near Palm Desert, 23 July 1969, 1 male, S. Frommer, L.F. LaPre & W.H. Ewart; Pleasant Lane, 1 September 1967, 2 males, R.D. Sjorgen. Sacramento Co. Rio Linda, 14 August 1958, 10 males, R.E. Darby. San Diego Co. San Luis Rey River (c. 2 km from coast), 11 May 1968, 5 males, E.I. Schlinger; Santee, 6 December 1963, 2 males, E.P. Perry. Tulare Co. Woodlake, 28 July 1947, 1 male (hypopygium), W.W. Wirth. Ventura Co./Los Angeles Co. Westlake Village, 14 September 1967, 2 males, H.I. Magy & M.B. Madon. Yolo Co. Davis, 19 July 1956, 1 male (hypopygium), 2 August 1956, 1 male, 7 August 1956, 2 males, 22 August 1956, 2 males + 1 hypopygium, 4 August 1958, 1 male, 25 August 1958, 1 male, R.E. Darby.

Etymology

The specific name, derived from the Latin word meaning *pine-bearing*, refers to the shape of the stout tree-like median volsellae.

Diagnosis

Antennal plume fully developed or slightly reduced, composed of sparse setae. Tibial apices of middle and hind leg enlarged, with strongly curved setae; spurs and combs of middle and/or hind tibia reduced or absent. Anal point slender, with narrowed apical part. Stem of median volsella long and stout, distinctly bent at base and directed posteriorly, with strongly curved furcate lamellae; stem distinctly longer than lamellae. Inferior volsella reaching half length of gonostylus at most, with extensive globular swelling ventrally.

Description

Male (n = 74, incl. 2 separated hypopygia; dimensions in Tables 6 and 8).

Colouration (slide-mounted specimens). Antennal pedicel, tentorium, scutal stripes, postnotum and sternum brown to dark brown. Remaining body parts green to olive brown. Wing membrane transparent with pale olive undertone; C, M and radial veins darker.

Head. Antenna composed of 13 flagellomeres. Plume fully developed or slightly reduced and composed of sparse setae. Frontal tubercles variable in size, usually cylindrical. Palp variable in length; intermediate form as in Fig. 15C.

Wing. Usual in shape, slender. At most C and R with sparse macrotrichia, other veins bare. Membrane with a few macrotrichia in apical section of r_{4+5} or completely bare. FCu distinctly distal of RM. R_{4+5} ending well distally of M_{3+4} and slightly proximally of M_{1+2} .

Legs. Slender. Tibial spur of fore leg straight or slightly curved (Fig. 11A), but usually absent. Tibial spurs of middle and hind leg usually present, shortened, double or single; combs usually present but vestigial in hind leg and usually absent in middle leg (Fig. 11B, C; Table 8). Tibial apices of middle and hind leg enlarged, bearing strongly curved setae (Fig. 11B, C). For lengths of leg segments see Table 6.

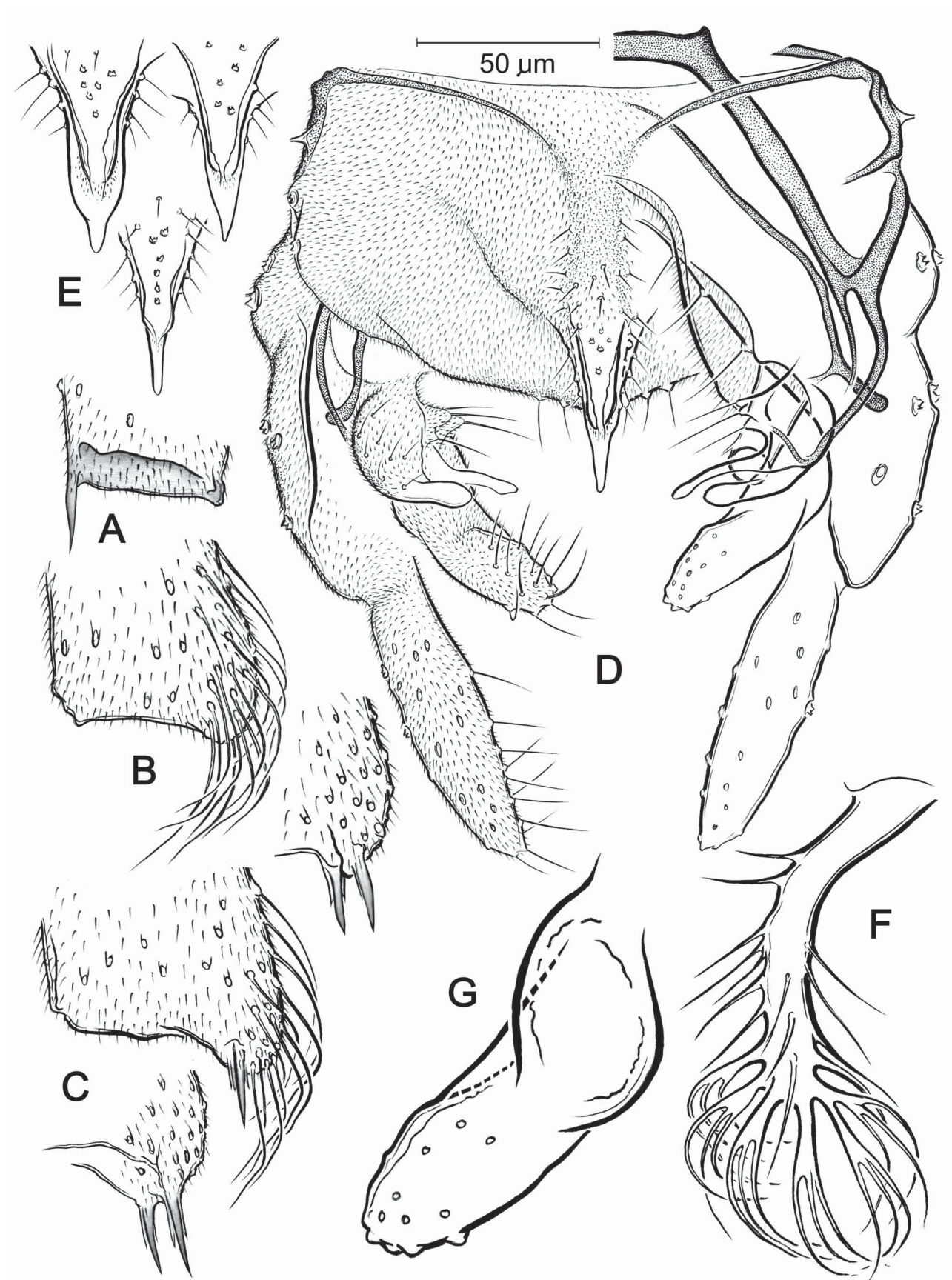


FIGURE 11. *Cladotanytarsus* (*Lenziella*) *piniger* sp. nov., male. A–C: tibial apices of fore leg (A), middle leg (B) and hind leg (C) (variation); D: hypopygium; E: anal point (variation); F: median volsella (magnified x 1.5 relative to hypopygium); G: inferior volsella with ventral swelling.

TABLE 6. Lengths (µm) of leg segments of male *Cladotanytarsus (L.) piniger* sp. nov.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	485–590 (540)	345–455 (400)	455–580 (530)	230–330 (275)	190–250 (220)	125–145 (135)	80–105 (90)
p ₂	490–615 (565)	410–530 (480)	200–265 (230)	110–160 (135)	90–125 (105)	65–90 (80)	50–80 (70)
p ₃	575–735 (665)	565–735 (665)	340–435 (400)	230–295 (270)	205–255 (235)	145–185 (165)	95–120 (105)

Hypopygium (Fig. 11D–G). Gonostylus slender, apically pointed. Anal tergite with V-type bands. Anal point slender, subtriangular, with elongated and narrowed apical part, somewhat variable in shape, as shown in Fig. 11E; entire area surrounding base of anal point covered with microtrichia. Superior volsella rounded at base, distinctly narrowed in median part and slightly swollen apically, bearing dense microtrichia in proximal half. Digitus long, slightly curved, with finger-like tip. Long inner setae placed on small protuberance at base of superior volsella, one seta with its tubercle slightly distant (Fig. 11D). Stem of median volsella long and stout, distinctly bent at base and directed posteriorly, bearing 5–6 strongly curved furcate lamellae (Fig. 11F). Inferior volsella of *bicornutus* type, but directed posteromedially and reaching half length of gonostylus at most, slightly swollen in distal part, apically rounded, with finely protruding dorsomedian ridge and extensive globular swelling ventrally (Fig. 11D, G).

Adult female, pupa and larva: unknown.

Remarks

The adult male of *Cladotanytarsus (L.) piniger* is easily distinguishable by the slender anal point and the distinctly bent and long stem of the median volsella bearing short and strongly curved lamellae (Fig. 11 D–F). In fact, the latter character is known from some species of the genus, e.g. *Cladotanytarsus (C.) nigrovittatus* (Goetghebuer) and *C. (C.) gedanicus* Gilka; however, the enlarged tibial apices of middle and hind leg (Fig. 11B, C) as well as the ventral globular swelling of the inferior volsella (Fig. 11G) allow a reliable identification and inclusion of the new species into the subgenus *Lenziella*.

Cladotanytarsus (L.) piniger was presumably erroneously identified as *Tanytarsus viridiventrus* in Darby's (1962) article (Sublette, pers. comm.). The paper includes comprehensive information on biology of a species that inhabits pools, drainage ditches, and periodically flooded rice fields in California. The data collected in this study may suggest that *C. (L.) piniger* and *T. viridiventrus sensu* Darby (1962) denote the same eurytopic species. Moreover, a pupa included in the key of Bilyj and Davies (1989) and referred to Darby (l.c.), corresponds well with the present concept of *Lenziella*. The pupal source material, unfortunately, was not accessible for the present study.

Cladotanytarsus (Lenziella) subletteorum sp. nov.

(Figures 12–14, 15D)

Type material

Holotype. Male. USA, FLORIDA, Polk Co. Lake Ruby near Winter Haven, 16 December 1968, leg. R.A. Crossman. Paratypes. 6 males (incl. 3 pharate), 1 pharate female and 4 Pex as holotype; Lake Ruby, 2 December 1968, 4 Pex, 5 males (incl. 4 pharate), 18 December 1968, 2 males, 2 January 1969, 2 Pex, 2 pharate males, 16 October 1970, 1 Pex, 2 males (incl. 1 pharate), 23 November 1970, 1 male, R.A. Crossman. Lake Cannon (Winter Haven), 20 December 1968, 4 males, R.A. Crossman. Alachua Co. Gainesville, 22 April 1952, 1 male (hypopygium), J.R. Vockeroth. Leon Co. Blue Sink, 20 July 1966, 1 Pex, 1 male, W. Beck. West Palm Beach, Morrison Field, 21 October 1942, 1 male, D.E. Hardy.

Etymology

The specific name is a tribute to Mary and James Sublette.

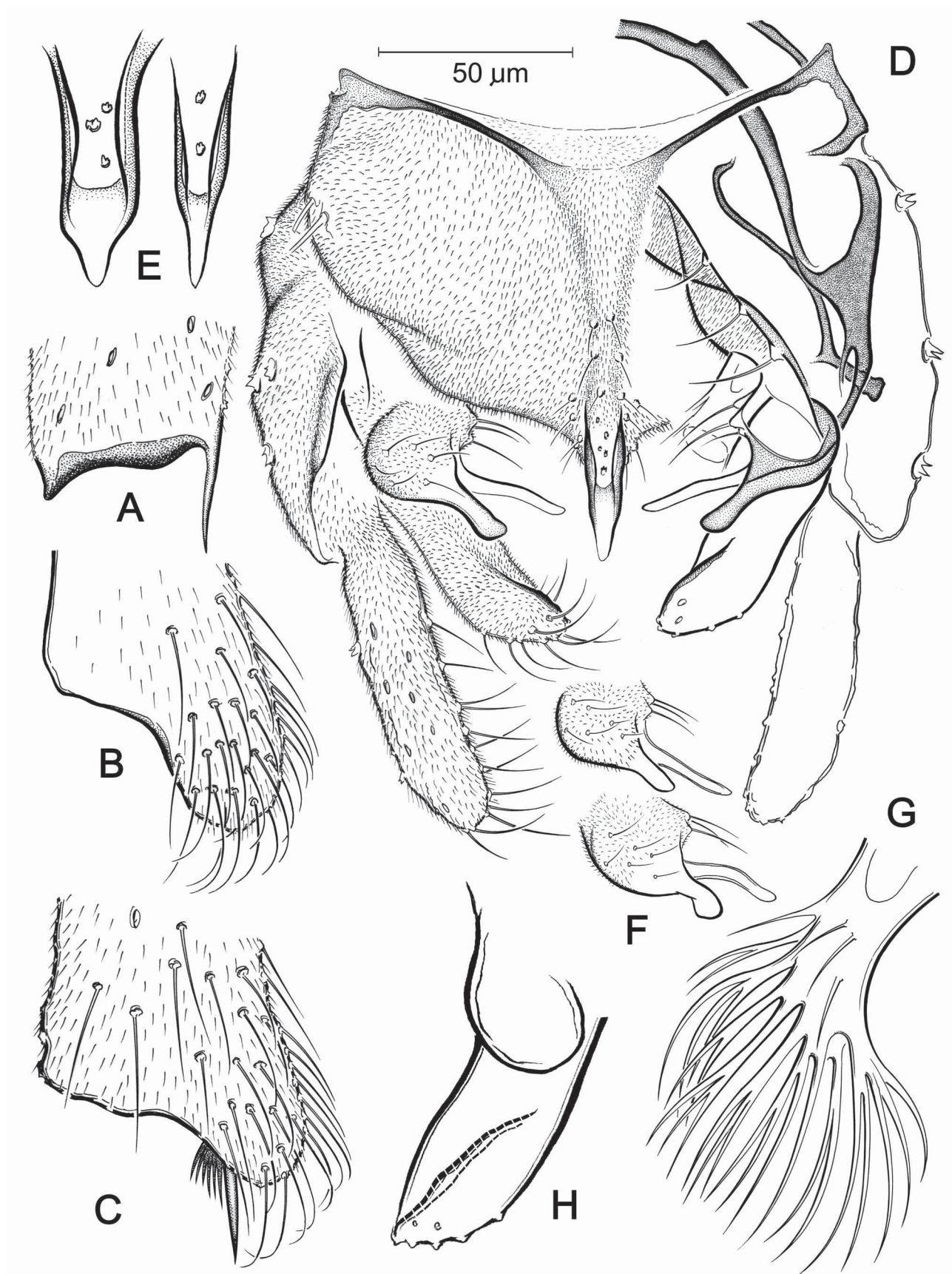


FIGURE 12. *Cladotanytarsus (Lenziella) subletteorum* sp. nov., male. A–C: tibial apices of fore leg (A), mid leg (B) and hind leg (C); D: hypopygium; E: anal point (variation); F: superior volsella, digitus and inner setae (variation); G: median volsella (magnified x 1.5 relative to hypopygium); H: inferior volsella with ventral swelling.

Diagnosis

Adults (both sexes). Tibial apices of middle and hind leg enlarged, with dense curved setae; spurs and combs of middle and/or hind tibia reduced or absent. *Male*. Antennal plume composed of long but sparse setae. Anal point slender, subtriangular, usually with nipple-shaped apex, spinulae distinct. Inferior volsella bearing fine globular swelling ventrally. *Female*. Sternite VIII with setae placed in longitudinal irregular rows under large vaginal floor close to median vaginal margins. Gonapophysis VIII extensive. Labia wide, with parallel posteromedian margins, broadly rounded caudally, protruding beyond posterior margin of SVIII. *Pupa*. Cephalic tubercles relatively short, with setae four times as long as tubercle; granulose sculpture covering bases of tubercles and frontal apotome laterally. Thoracic horn spindle-shaped, with darkly coloured basal part. Tergite patches with spinulate shagreen laterally, microspinulae arranged in short rows; TII patch oval, TIII patch subtriangular, TIV–VI patches elongate, with TVI patch three times as long as wide. Smallest species among the *Lenziella* and *Cladotanytarsus*.

Description

Male (n = 26, incl. 10 pharate specimens and 1 separated hypopygium; dimensions in Tables 7 and 8).

Colouration (slide-mounted specimens). Antennal pedicel, tentorium, scutal stripes, postnotum, sternum, legs, and hypopygium greenish brown to dark brown. Remaining body parts yellowish green to pale brown. Wing membrane transparent; C, M and radial veins slightly darker.

Head. Antenna composed of 13 flagellomeres, distal flagellomeres sometimes indistinctly separated. Plume composed of long but sparse setae. Frontal tubercles variable in size, usually cylindrical. Palp slightly shortened, variable in length; intermediate form as in Fig. 15D.

Wing. Usual in shape, slender, similar to that found in *C. (L.) piniger*. C, R and short distal section of M_{1+2} with sparse macrotrichia at most, other veins bare. Membrane with a few macrotrichia in apical section of r_{4+5} or completely bare. FCu distinctly distal of RM. R_{4+5} ending well distally of M_{3+4} and slightly proximally of M_{1+2} .

Legs. Slender to slightly shortened, stout. Tibial spur of fore leg straight or slightly curved (Fig. 12A), usually present. Tibial spur of middle leg exceptionally present (n = 1), vestigial; spur(s) of hind leg single or double, always present; comb(s) of hind leg double, single and/or vestigial but always present; middle leg without combs (Fig. 12B, C; Table 8). Tibial apices of middle and hind leg enlarged, bearing dense curved setae (Fig. 12B, C). For lengths of leg segments see Table 7.

TABLE 7. Lengths (µm) of leg segments of male *Cladotanytarsus (L.) subletteorum* sp. nov.

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
p ₁	395–520 (470)	240–355 (330)	390–485 (440)	185–235 (215)	145–175 (165)	105–125 (120)	80–90 (85)
p ₂	425–500 (470)	355–425 (390)	175–205 (190)	95–120 (110)	75–95 (85)	55–65 (60)	50–65 (60)
p ₃	550–625 (600)	505–595 (550)	285–360 (315)	200–255 (230)	160–235 (195)	120–140 (130)	80–95 (90)

Hypopygium (Fig. 12D–H). Gonostylus slightly curved and widely rounded apically. Anal tergite with V-type bands. Anal point slender, subtriangular, usually with nipple-like apex, variable in shape, as shown in Fig. 12D, E; spinulae distinct, exceptionally absent (n = 1); entire area surrounding base of anal point covered with microtrichia. Superior volsella rounded at base, strongly narrowed in median part and slightly swollen apically, bearing dense microtrichia in proximal half. Digitus long, slightly curved, regularly tapering to tip. Long inner setae placed on small protuberance at base of superior volsella (Fig. 12D, F). Stem of median volsella stout but short, straight or slightly curved and directed posteriorly, bearing 5–6 finely curved furcate lamellae (Fig. 12G). Inferior volsella reaching half length of gonostylus, slightly bent and directed medially, rounded at apex, bearing slightly protruding dorsomedian ridge and fine globular swelling ventrally (Fig. 12D, H).

Female (pharate, n = 1).

Colouration. Indefinable in pharate specimen examined (apparently as in male).

Head. Antenna with 4 or 5 flagellomeres (proximal part of flagellum indistinctly segmented). Frontal lobes bearing apical minute tubercles, as long as wide at base. Palp similar to that found in male, slightly shortened, composed of 5 distinct palpomeres. Clypeus with 15 setae.

Thorax chaetotaxy. Ac unobservable, Dc at least 2, Pa 1, Sets unobservable.

Wing. Poorly observable inside pupal sheaths.

Legs. Tibial spur of fore leg present. Tibiae of middle leg with one or two vestigial combs, at least single short spur present. Tibia of hind leg with two combs; at least one comb bearing spur (the second comb vestigial with one spur-like tooth). Tibial apices of middle and hind leg enlarged, bearing long curved setae.

Genitalia (Fig. 13). Gonocoxite with 2 setae. Tergite IX broad, subtriangular, with 12 setae, lateral teeth present. Sternite VIII with 13 stout setae in median position and 6 weaker setae placed in longitudinal irregular rows under vaginal floor close to median margin of vaginal chamber. Gonapophysis VIII single-lobed, extensive, caudo-median margins broadly rounded, converging to large floor covering over one-third of anterior part of vagina, with dense microtrichia directed medially (Fig. 13B). Rami robust, tapering to short (65 μ m) notum. Labia wide, with parallel posteromedian margins, broadly rounded caudally, protruding beyond posterior margin of SVIII. Gonocoxapodeme slightly curved. Coxosternapodeme stout, angular, with median lobes connected by sinuous transverse bridge. Seminal capsules ovoid, subequal in size, larger 48 μ m long and 40 μ m wide, smaller 44 μ m long and 38 μ m wide, with necks apparently in posterolateral position (seminal capsules shifted in specimen examined); spermathecal ducts strongly curved, c. 155 μ m long. Postgenital plate subtriangular. Cercus 65 μ m long, pear-shaped, with slightly concave dorsomedian lobe not extending beyond ventromedian margin.

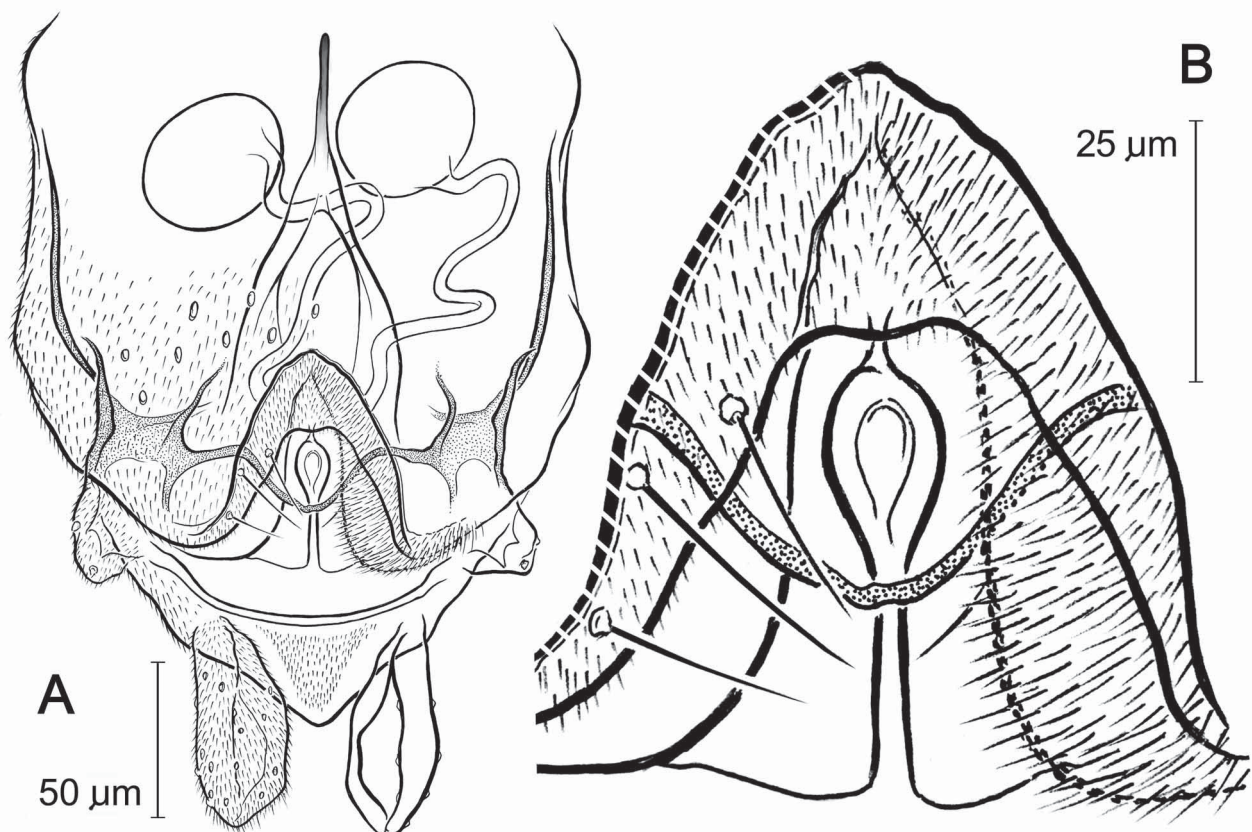


FIGURE 13. *Cladotanytarsus* (*Lenziella*) *subletteorum* sp. nov., female. A: genitalia, B: gonapophysis VIII, labia and coxosternapodeme bridge (magnified).

Pupa (exuviae, n = 12).

Length. 2.3–3.0 (2.7) mm.

Colouration (slide-mounted specimens). Pale yellowish. Base of thoracic horn dark brown or black.

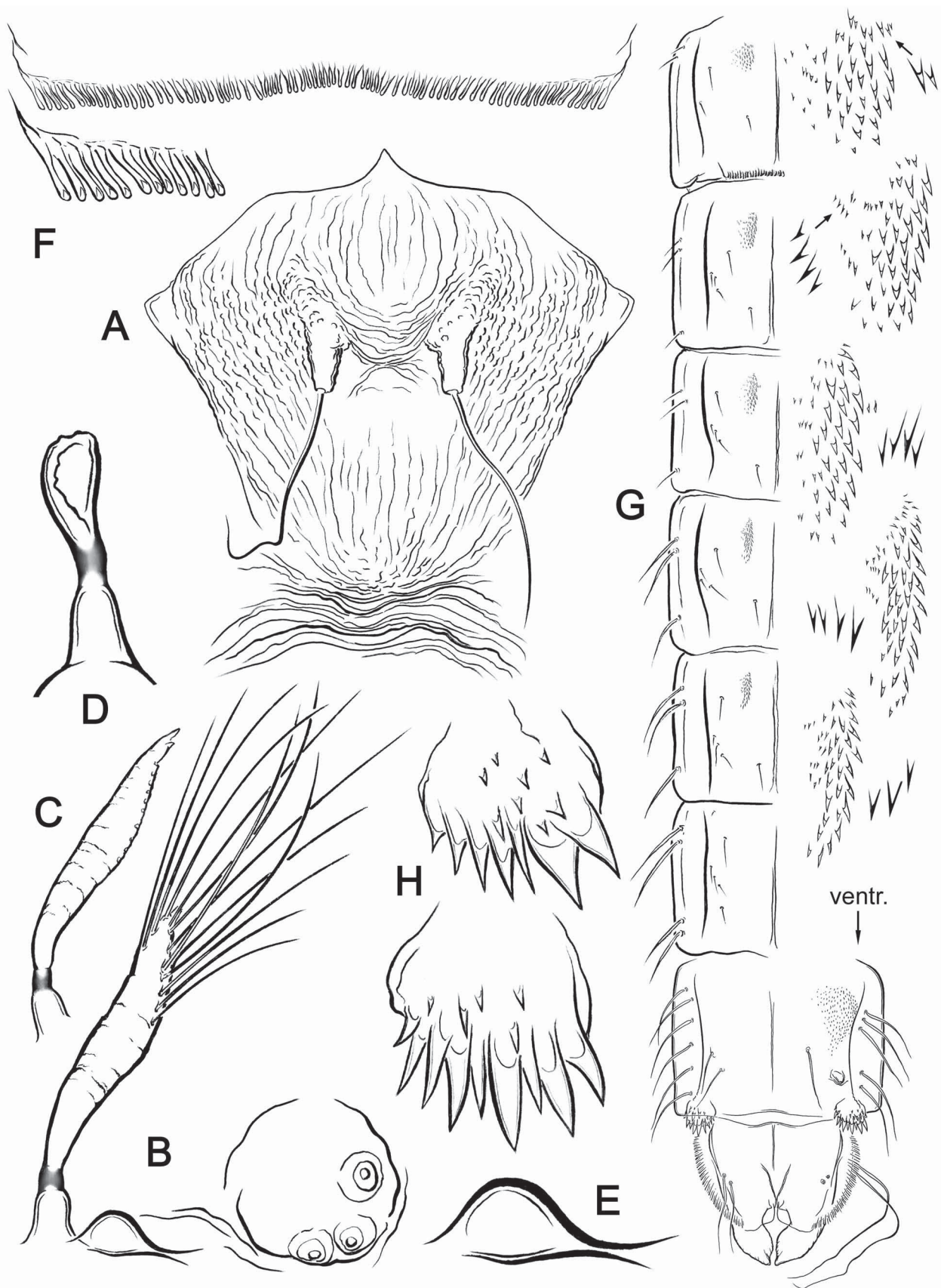


FIGURE 14. *Cladotanytarsus* (*Lenziella*) *subletteorum* sp. nov., pupa. A: frontal apotome; B: thoracic horn, precorneal swelling and tubercle; C: variation of thoracic horn (chaetae omitted); D: thoracic horn broken (magnified); E: pre-corneal tubercle (magnified); F: row of hooks on abdominal tergite II and its magnified part; G: abdomen, spine patches and rows of microspinules on tergites II–VI (magnified); H: posterolateral comb of segment VIII (variation).

TABLE 8. Comparison of metric and meristic characters of male *Lenziella*. Lengths in μm , except for wing. For lengths of leg segments see Tables 1–3 and 5–7.

Character \ species	<i>C. (L.) amandus</i>	<i>C. (L.) bicornutus</i>	<i>C. (L.) erusculus</i>	<i>C. (L.) latissimus</i>	<i>C. (L.) piniger</i>	<i>C. (L.) subleiteorum</i>
Wing length (mm)	1.38–1.62 (1.50)	1.16–1.86 (1.33)	0.98–1.39 (1.19)	c. 1–1.23	1.08–1.42 (1.26)	0.95–1.20 (1.01)
Wing length / max. width	3.33–3.59 (3.44)	2.40–3.13 (2.78)	2.84–3.59 (3.11)	c. 3	3.43–3.57 (3.50)	3.57–3.65 (3.60)
AR	0.65–0.77 (0.73)	0.50–0.82 (0.62)	0.40–0.47 (0.43)	0.31–0.42 (0.35)	0.68–0.93 (0.83)	0.45–0.82 (0.56)
Frontal tubercles (length & width at base)	10–20 & 4–6	15–35 & 8–15	16–31 & 8–15	10–25 & 4–12	8–32 & 8–12	12–20 & 4–8
Pm ₂ (length)	28–44 (36)	28–40 (34)	17–29 (22)	16–20 (17)	28–40 (33)	24–28 (25)
Pm ₃ (length)	63–99 (83)	55–95 (76) Pm ₃ \geq Pm ₄ (50%)	28–49 (37)	24–36 (29) Pm ₃ = Pm ₄ (20%)	57–75 (67)	36–48 (42)
Pm ₄ (length)	67–107 (89) Pm ₄ > Pm ₃ (100%)	59–91 (78) Pm ₄ > Pm ₃ (50%)	39–57 (45) Pm ₄ > Pm ₃ (100%)	32–44 (36) Pm ₄ > Pm ₃ (80%)	60–79 (73) Pm ₄ > Pm ₃ (100%)	52–56 (53) Pm ₄ > Pm ₃ (100%)
Pm ₅ (length)	99–143 (125)	107–147 (133)	63–94 (75)	36–56 (44)	79–127 (109)	79–95 (87)
Clypeals	14–16	12–18	15–30	10–15	14–25	12–18
Acrostichals	4–5	6–13, exceptionally 2	2–7, usually 3–4	4–6 weak	5–8	4–6
Dorsocentrals	6–8	6–11, exceptionally 3	absent, exceptionally 2	5–7 weak	5–9	5–7
Prealars	1–2, usually 1	1–2, usually 1	1–3, usually 1	1–2 or absent	1–2, usually 1	0–2
Scutellars	5–6 in row	4–8 in row	2–6	2–6 or absent	4–8, usually 6 in row	2–4
LR ₁	1.29–1.52 (1.44)	1.29–1.69 (1.56)	1.10–1.24 (1.17)	1.12–1.28 (1.22)	1.24–1.42 (1.33)	1.19–1.43 (1.28)
LR ₂	0.46–0.53 (0.50)	0.39–0.52 (0.47)	0.47–0.59 (0.51)	0.44–0.50 (0.47)	0.45–0.53 (0.49)	0.45–0.52 (0.49)
LR ₃	0.56–0.60 (0.58)	0.40–0.57 (0.51)	0.50–0.55 (0.53)	0.50–0.56 (0.52)	0.57–0.63 (0.60)	0.54–0.60 (0.57)
p ₁ spur (length)	15–20	15–25, usually present	absent	absent	8–12, usually absent	8–16, usually present
p ₂ spur(s) (length)	10–15	15–20, usually absent	absent	absent	8–10, usually present	c. 5, usually absent
p ₃ spur(s) (length)	15–25	15–25, usually absent	absent	absent	5–20, usually present	12–20, always present
p ₂ combs (no. of teeth)	4–7	3–15, usually present	absent	absent	2–3, usually absent	absent
p ₃ combs (no. of teeth)	4–20	3–20, usually present	absent	absent	2–5, usually present	5–20, always present
Gonostylus (length)	70–100	75–100	75–100	75–100	70–100	65–95
MVo stem (length)	35–40	35–45	55–70	30–50	60–80	30–35
Median setae	7–11	8–21	7–18	6–11	11–22	2–8
Basilateral setae	1	1 or absent	1 or absent	1, rarely 2 or absent	1–3	1–2, rarely absent
SVo dorsal setae	7–10	6–16	6–11	7–11	5–10	6–10
Inner setae	3	3	4–6, usually 4	3–4	3, exceptionally 4	3
AP spinulae	6–11	6–12, rarely 2 or 3	0–6, usually 2 or 3	0–6, usually 2 or 3	2–7, usually 5 or 6	0–5, usually 2 or 3

Cephalothorax. Frontal apotome with relatively short but stout conical cephalic tubercles, 24–28 (26) μm long, each with seta about four times as long as tubercle; fields of granulose sculpture covering bases of tubercles and apotome laterally (Fig. 14A). Thoracic horn spindle-shaped, slightly curved, widest at mid-length (Fig. 14B, C), fragile and often broken in proximal part (Fig. 14D), 46–60 (50) μm long (when complete), with elongate cylindrical basal lobe and 10–15 chaetae placed in distal part, longest chaetae as long as horn; precorneal swelling with 3 setae; precorneal tubercle hemispherical, 8–14 μm high and 15–20 μm wide, placed between basal lobe and precorneal swelling (Fig. 14B, E). Thorax with narrow median patch of c. 50–70 small spinules becoming minute points posteriorly. Wing sheath with well developed nose distinctly projecting (15–20 μm) beyond posterior margin.

Abdomen. TI–VIII with sublateral bands. Tergite patches relatively extensive for the subgenus, each consisting of spines becoming spinulate shagreen laterally, with microspinulae arranged in distinct short rows; TII patch oval, TIII patch subtriangular, TIV–VI patches elongate, with TVI patch relatively extensive, three times as long as wide; TI and TVII without patches (Fig. 14G). TII hook row c. 160–200 μm long, 0.45–0.50 of TII width, composed of 65–85 hooklets (Fig. 14F). Pedes spurii A absent, pedes spurii B vestigial. Posterolateral comb of segment VIII stout, 40–48 (43) μm wide, with 6–10 teeth and 3–10 smaller spines; shape and arrangement of teeth variable (Fig. 14H). SVIII with subtriangular shagreen anterolaterally and with small, usually indistinct, single-lobed tubercle in posterolateral position. Taeniate L-setae on segments V–VIII arranged as follows: 2 + 1; 2 + 1; 2 + 2; 3 + 2 or 3 + 3 or 5–6 equidistant on each side. Anal lobe with 2 dorsal setae and fringe composed of 25–33 taeniate setae per side (Fig. 14G).

Larva: unknown.

Remarks

This new species is the smallest known *Cladotanytarsus* [cf. Jacobsen & Bilyj (2007)]. A set of characters listed in the diagnosis and in Table 8 allows easy identification. The data collected indicate that *C. (L.) subletteorum* is a limnophilous species.

Key to adults of *Lenziella*

1. Tibial apices of middle and hind leg distinctly enlarged, forming stout lobes (Figs 2C, D; 4B–E; 5, 8, 11, 12: B, C); inferior volsella with globular swelling ventrally (Figs 2H, 4K, 5G, 8G, 11G, 12H); sternite VIII with several setae placed in longitudinal rows under vaginal floor close to median margins or directly on vaginal margins; labia extensive, protruding beyond posterior margin of SVIII (Figs 6A, B; 9A–D; 13A, B): *Cladotanytarsus (Lenziella)* 2
- Tibial apices of middle and hind leg never distinctly enlarged; inferior volsella without globular swelling ventrally; sternite VIII occasionally with few setae dispersed under vaginal floor; labia fine, never protruding beyond posterior margin of SVIII, often drawn out into finger-like lobes [see Bilyj & Davies (1989, figs 9–17)]: *Cladotanytarsus (Cladotanytarsus)*, not keyed.
2. Antenna with 10–13 flagellomeres, proximal and/or distal flagellomeres indistinctly separated or fused, plume showing tendency for reduction, setae short and/or sparse (Fig. 2A; Gilka 2001, fig. 10A). **Males** 3
- Antenna with 4 or 5 flagellomeres, proximal flagellomere/s/ indistinctly separated, plume absent. **Females** 8
3. Anal point extraordinarily broad, trapezoid (Fig. 8D, E); hind tibia with single stout bristle apically (Fig. 8C) *C. (L.) latissimus* sp. nov.
- Anal point slender, subtriangular, lanceolate or club-shaped but never trapezoid (Figs 2E, F; 4F, G; 5, 11, 12: D, E); hind tibia without single stout bristle apically (Figs 2D; 4D, E; 5, 11, 12: C) 4
4. Inner setae (4–6) placed on prominent lobe at base of superior volsella (Fig. 5D); anal point spinulae small or absent and replaced with setae (Fig. 5D, E); tibial spurs and combs absent (Fig. 5A–C) *C. (L.) cruscus* (Sæther)
- Inner setae (3, exceptionally 4) placed on small protuberance at base of superior volsella, anal point spinulae distinct, never replaced with setae (Figs 2E, F; 4F, G; 11D, E; 12: D, E, F); tibial spurs and combs reduced or vestigial but usually present on middle or/and hind leg (Figs 2C, D; 4B–E; 11, 12: B, C) 5
5. Superior volsella slightly narrowed in median part and distinctly swollen apically (Fig. 2E); hind tibia with tuft of long and finely bent setae (Fig. 2D) *C. (L.) bicornutus* (Kieffer)
- Superior volsella strongly narrowed in distal half and finely swollen apically (Figs 4F, H; 11D; 12 D, F); hind tibia with relatively short or/and strongly curved setae (Figs 4D, E; 11C; 12C) 6
6. Anal point stout, parallel-sided or somewhat lanceolate (Fig. 4F, G) *C. (L.) amandus* Hirvenoja
- Anal point slender, subtriangular (Figs 11, 12: D, E) 7
7. Stem of median volsella distinctly bent at base, with strongly curved furcate lamellae, stem distinctly longer than lamellae (Fig. 11F) *C. (L.) piniger* sp. nov.

- Stem of median volsella straight or slightly bent, with slightly curved furcate lamellae, stem as long as lamellae (Fig. 12G) *C. (L.) subletteorum* sp. nov.
- 8. Hind tibia with single stout bristle apically; labia with posteromedian margins concave or irregularly rounded caudally, gonapophysis VIII relatively weak (Fig. 9A–D). *C. (L.) latissimus* sp. nov.
- Hind tibia without stout bristle apically; labia with posteromedian margins parallel-sided, smoothly rounded caudally, gonapophysis VIII extensive (Figs 6, 13: A, B) 9
- 9. Vaginal floor moderately wide, covering about one-sixth of anterior part of vagina (Fig. 6A, B). *C. (L.) cruscus* (Sæther)
- Vaginal floor large, covering over one-third of anterior part of vagina (Fig. 13A, B) *C. (L.) subletteorum* sp. nov.

Key to pupae of *Lenziella*

- 1. Frontal apotome with stout cephalic tubercles and extensive fields of strongly granulose sculpture (Figs 3, 7, 10, 14: A); hemispherical tubercle between basal lobe of thoracic horn and precorneal swelling present (Figs 3, 7: B, C; 10B; 14: B, E): *Cladotanytarsus* (*Lenziella*) 2
- Frontal apotome with relatively small cephalic tubercles and/or fine sculpture or apotome smooth; hemispherical tubercle between basal lobe of thoracic horn and precorneal swelling absent [see also Bilyj & Davies (1989, figs 18–43); Langton (1991) and Langton & Visser (2003)]: *Cladotanytarsus* (*Cladotanytarsus*), not keyed.
- 2. Thoracic horn large, c. 300 µm long (Fig. 3B); TII hook row with 130–150 hooklets (Fig. 3D); posterolateral comb of SVIII with 15–25 teeth and 3–10 smaller spines (Fig. 3F); anal lobe with 40–47 taeniate setae per side (Fig. 3E) *C. (L.) bicornutus* (Kieffer)
- Thoracic horn small, c. 30–60 µm long (Figs 7, 10, 14: B); TII hook row with 65–90 hooklets (Figs 7D, 10C, 14F); posterolateral comb of SVIII with 6–12 teeth and 0–10 smaller spines (Figs 7F; 10E, F; 14H); anal lobe with 25–38 taeniate setae per side (Figs 7E, 10D, 14G) 3
- 3. Cephalic tubercles with setae about four times as long as tubercle (Fig. 14A); thoracic horn spindle-shaped (Fig. 14B, C); tergite patches with spinulate shagreen laterally and microspinulae arranged in distinct short rows (Fig. 14G) *C. (L.) subletteorum* sp. nov.
- Cephalic tubercles with setae about twice as long as tubercle (Figs 7A, 10A); thoracic horn subtriangular (Fig. 7B) or club-shaped (Fig. 10B); tergite patches with spinulate shagreen laterally and microspinulae/points placed in irregular rows/clusters or arranged evenly (Figs 7E, 10D) 4
- 4. Thoracic horn subtriangular, uniformly pale yellowish (Fig. 7B). *C. (L.) cruscus* (Sæther)
- Thoracic horn club-shaped, darkly coloured at base (Fig. 10B) *C. (L.) latissimus* sp. nov.

Discussion

The following characters of generic value, traditionally considered in the taxonomic analysis and used in diagnoses of the *Cladotanytarsus*, were accepted in the present study: the furcate lamellae in male hypopygial median volsella, the taeniate setae placed on conspicuous roundish precorneal swelling and the relatively small anterior pairs of spine patches on tergites II–VI in the pupa, a short wedge-shaped antennal segment 2, the large Lauterborn organs placed on a small pedicel and the finely serrated claws on the posterior parapods in the larva. All the characters listed were found in the species reviewed in the present study, hence their generic placement is recognized as legitimate.

The following characters are discussed to explain relationships within the *Cladotanytarsus* and close genera of the tribe as arguments supporting the subgeneric position of *Lenziella*:

Antenna and maxillary palp. The antenna in adult males as well as the maxillary palp in the imagoes of both sexes in *Lenziella* clearly tend to become shortened and/or have a reduced number of segments (Figs 2A, 15A–F). These characters, however, are variable within the subgenus, and occasionally within the species as well, hence they are of a limited value in the affinity analysis, as suggested by Sæther (1971) and may be associated with the behaviour. Similar relationships between the structure of the antenna, the maxillary palp and wing, and flight ability have been observed in other genera of the tribe Tanytarsini (e.g. Gilka & Paasivirta 2009, Gilka & Jażdżewska 2010). Interestingly, the *Lenziella* females were observed to show a tendency, opposite to that in the males, to the division of the proximal segment of the antenna and the formation of a 5-segment flagellum. This tendency, however, needs to be further explored by examination of a larger series of emerged specimens.

Legs and tibial armature. In most species of *Cladotanytarsus*, the tibial combs of middle and hind leg are double, distinctly separated, each comb usually bearing a spur. Reduction or lack of tibial combs and spurs is known from several species of the subgenus *Cladotanytarsus* s. str. (e.g. Cranston 1989, Gilka 2009), and the feature, according to Cranston's suggestions (op. cit.), can be apparently defined as homoplasy. The massive, but distinctly

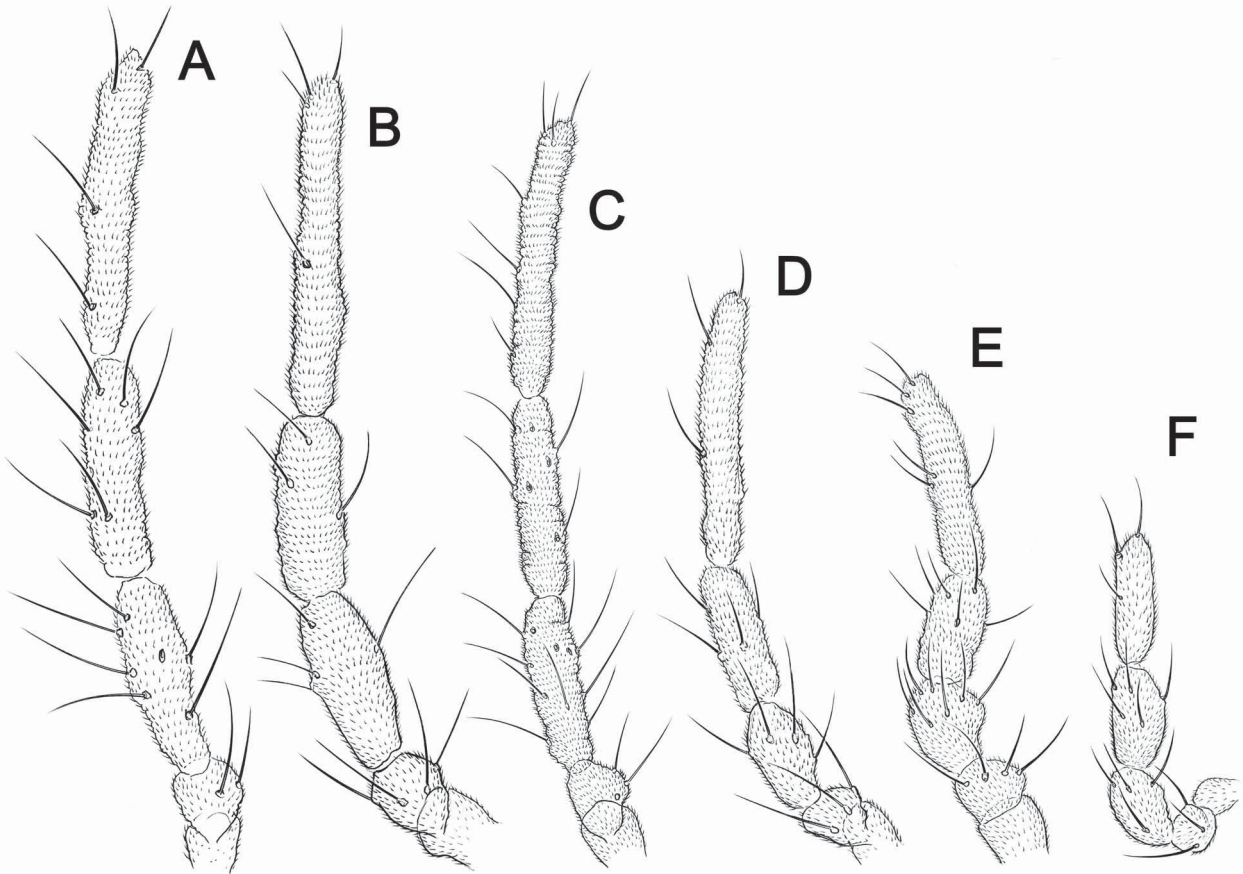


FIGURE 15. Maxillary palp of male. A: *Cladotanytarsus (Lenziella) amandus* Hirvenoja, 1962, B: *C. (L.) bicornutus* (Kieffer, 1922), C: *C. (L.) piniger* sp. nov., D: *C. (L.) subletteorum* sp. nov., E: *C. (L.) cruscus* (Sæther, 1971), F: *C. (L.) latissimus* sp. nov.

shortened legs observed in *Lenziella*, similarly to the antenna and maxillary palp, may be adaptations evolved in relation to reduced activity. However, the enlarged tibial apical lobes, found in *Lenziella*, have not been detected in other *Cladotanytarsus*, therefore this character state is here proposed to be treated as a prior apomorphy for the subgenus *Lenziella*. Moreover, the presence of the enlarged tibial apical lobes is independent of shortened legs and maxillary palps, as enlarged tibial apical lobes appear also in those species featuring slender legs and relatively well-developed maxillary palps: *C. (L.) amandus*, *C. (L.) bicornutus*, *C. (L.) piniger* and *C. (L.) subletteorum* (Fig. 15). The tibial lobes are the best character for rapid identification of pharate adults of both sexes.

Hypopygium. The globular swelling in the male inferior volsella is a distinct character defined as a subgeneric apomorphy for *Lenziella*. This structure is well-visible in ventral aspect, and is particularly well developed in *C. (L.) latissimus*, in which it resembles a large ball-shaped wrinkled excrescence (Fig. 8D, G). Somewhat similar, knee-like bend of inferior volsella is known from several species of the subgenus *Cladotanytarsus* s. str., but it never resembles the globular swelling.

Phallapodeme or notum(?) in male hypopygium. Another unusual structure found in males of *C. (L.) cruscus* and *C. (L.) latissimus* is the apodeme, apparently connected with the phallapodeme, forming a wide bridge under the hypopygial transverse sternapodeme (Figs 5D, 8D). It was recognized as ‘notum?’ by Sæther (1971); however, the origin and function of this interesting structure needs further research.

Female genitalia. The presence of setae under the vagina is a character given in the diagnosis of *Lenziella* by Sæther (1977). This feature was observed in all the females examined in this study. In *Lenziella*, the setae are arranged in longitudinal rows placed close to the median margins or directly on the margin of the vaginal chamber (Figs 6A, B; 9A–D; 13A, B). Although females of most *Cladotanytarsus* species have not been known, distribution of the setae as that described above has been so far observed only among *Lenziella*. In contrast, a few setae under

the vaginal floor were observed in the subgenus *Cladotanytarsus s. str.*, i.e., in *C. fusiformis* Bilyj and *C. bukavus* (Lehmann) (Bilyj & Davies 1989, Ekrem 1999), however, they are sparse and/or dispersed, and never distributed as in *Lenziella*. Other distinctive characters found in females of *Lenziella* are the extensive labia, which protrude beyond the posterior margin of the sternite VIII, whereas in the subgenus *Cladotanytarsus s. str.* the labia are relatively fine, often drawn out into finger-like lobes and never extend beyond the posterior margin of the gonapophysis VIII.

Frontal apotome and cephalic tubercles in pupa. The large cephalic tubercles and the strongly granulose sculpture on the frontal apotome are the characters which form a combination typical for *Lenziella* (Figs 3, 7, 10, 14: A). According to descriptions and the key provided by Bilyj and Davies (1989), *C. aeiparthenus* Bilyj shows a similar combination of characters. Therefore, the subgeneric placement of this parthenogenetic species should be revised in further research.

Precorneal tubercle. Pupae of *Lenziella* are also distinct in having the hemispherical tubercle placed between the precorneal swelling and the thoracic horn (Figs 3, 7: B, C; 10B; 14B, E). It was observed for the first time by Sæther (1971) in *C. (L.) cruscus*. The structure is well-developed in all the known pupae of *Lenziella*, and is treated here as a character of a subgeneric value.

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